JAMES MADISON
UNDERGRADUATE RESEARCH JOURNAL

JMURJ
James Madison Undergraduate Research Journal

VOLUME 6
2018 - 2019

Research helps students learn how to ask new questions and solve complex problems. We believe that these skill sets are valuable in every field and instill in students a sense of excitement about learning and the development of new knowledge.

- Jonathan Alger, President of James Madison University

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LETTER FROM THE EDITORS

Dear Reader,

Welcome to Volume 6 of the *James Madison Undergraduate Research Journal*! This publication represents the concerted effort of authors, reviewers, editors, and supporters from disciplines and offices across campus. We would like to thank them and our readers for continuing to support undergraduate research and scholarship here at JMU with such passion and dedication.

For this volume, our multidisciplinary team of 16 Editorial Board members worked with eight authors and 42 faculty reviewers to produce a publication that we can proudly say displays the breadth of JMU's undergraduate research efforts to our readers in more than 160 countries.

Throughout this volume, we wanted to work with more students from majors we had never represented before. In addition to pieces from Biology, Psychology, Media Arts & Design, and Political Science, we for the first time offer articles from Art History, Geographic Science, and Theatre. The volume also features a first article from Foreign Languages, Literatures, and Cultures. Author Jemma Stratton composed her piece in Spanish and then translated it into English for *JMURJ* (we've published her article in both languages).

Our Volume 6 outreach initiative started with a website redesign and grew to include a *Breeze* article, class presentations, and a presence at the year-end JMU Honors Symposium. We also collaborated in piloting a new version of Writing, Rhetoric and Technical Communication's Publication Management course. The joint effort bore immediate fruit, as two Fall 2018 Publication Management students equipped with a semester of publication theory and practice joined the *JMURJ* Editorial Board in Spring 2019.

Thanks for reading and we hope you enjoy this and future volumes.

All the best,

The *JMURJ* Editorial Board

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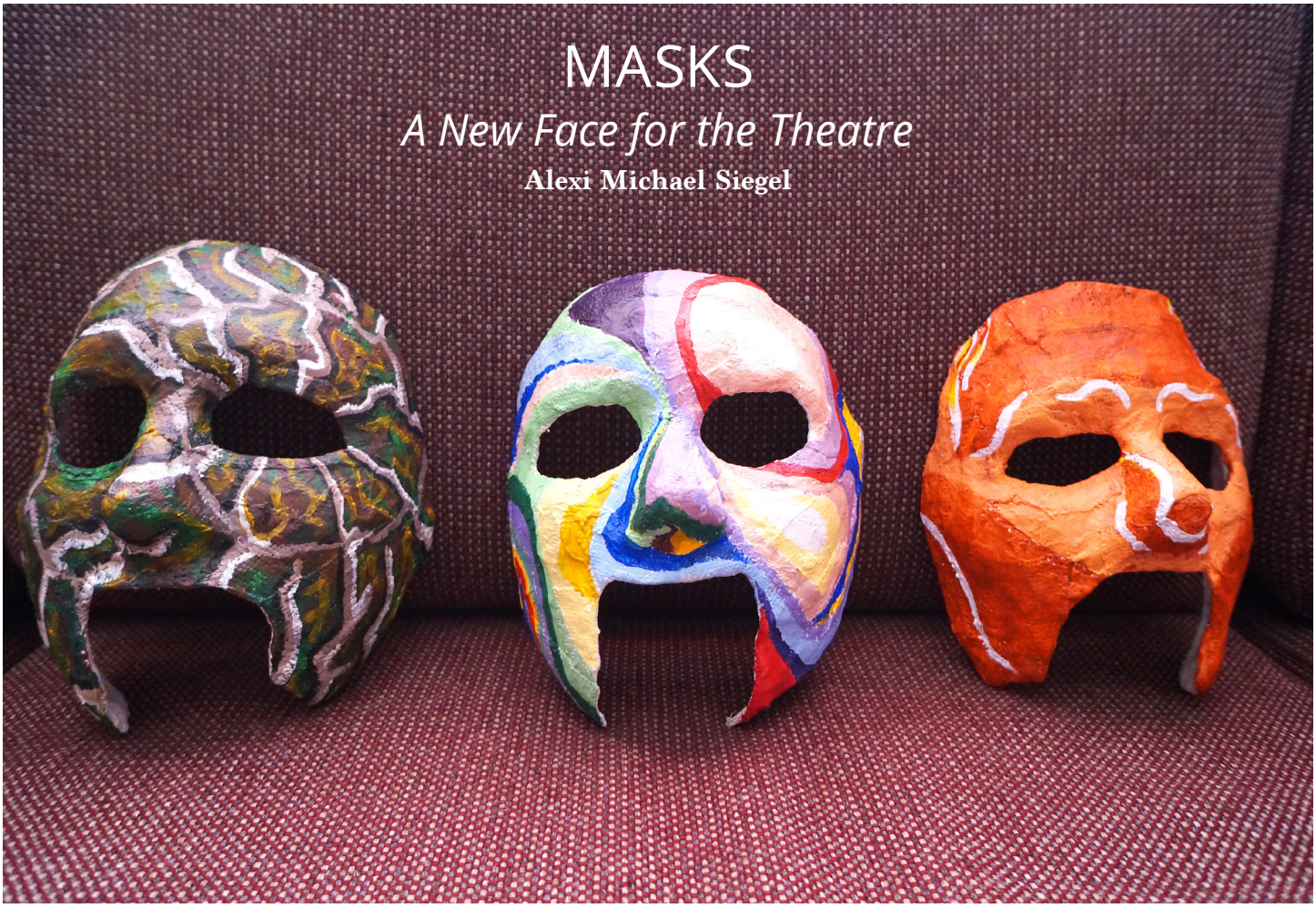
ACKNOWLEDGMENTS

We thank the 190+ faculty reviewers who have volunteered their time through the first six volumes of *JMURJ*, starting with the 42 Volume 6 faculty reviewers listed above. The Director of the School of Writing, Rhetoric and Technical Communication, Dr. Traci Zimmerman, remains an enduring champion for *JMURJ*. We also want to acknowledge Interim Vice Provosts Keith Holland and Anthony Tongen, Ms. Becky Rohlf, and Mr. Ben Delp in the Office of Research and Scholarship for their assistance. Thank you to photographers Jackson Westhoff (front and back covers) and Abigail Ramsay (inside cover) for their contributions to our publication. We have enjoyed ongoing technical support from WRTC's Sandra Purington and Kristin Knapp; the Learning Centers' Joan Fahrney and Adrienne Griggs, and the SSC's Megan Driver and her EPIC staff. Finally, we would like to thank President Jonathan Alger and Provost Heather Coltman for their interest and encouragement as we work to promote, publish, and share undergraduate research and scholarship throughout the JMU community.



ABSTRACT

This study seeks to reimagine and reinvigorate modern theatre's relationship with mask work through text-based historical research and practice-based artistic research. It focuses on three ancient mask traditions: pre- and early Hellenistic Greek theatre, Japanese Noh theatre, and Nigerian Egungun masquerades. Research on these mask traditions and recent masked productions informed the development and staging of a masked performance of Charles Mee's *Life is a Dream*. The production featured sections for each of the ancient masking styles and a final section that explored masks in a contemporary theatrical style. As a whole, this creative project pulls masks out of their historical context to discuss their relevance for contemporary theatre artists and to demonstrate how ancient traditions can inspire new work.

Early man donned the first mask at least 50,000 years ago, and since then masks have held special reverence for human beings (Eldredge 3). In very old, very distinct theatre traditions, as well as in timeless religious rituals, masks have transformed humans from their mere existence into something beyond it. This mysterious transformation was the reason why masks have been an indispensable tool for the theatre. The process of covering up one's face, the center of one's identity, unleashes untold potential for expressing the human experience. American playwright Eugene O'Neill described masks as being "more subtly, imaginatively, suggestively dramatic than any actor's face can ever be" (qtd. in Johnson 22), and world-renowned director Peter Brook has gone so far as to say "what is called mask [in the West] should be called an anti-mask. The traditional mask is an actual portrait, a soul portrait... an outer casing that is a complete and sensitive reflection of the inner life" (qtd. in Johnson 26). Masks uncovered the inner secrets of humans while also covering up the external expression of the literal face. Although many actors, directors, and playwrights have acknowledged their power, masks' presence in theatre today has dwindled greatly. Whether it is due to specialized training, fear, or a lack of resources, masked theatre is a rare form. Masks have been lost to the history books, relics of another time. The goal of my project was to reinvigorate and reimagine the modern theatre artist's relationship to mask work.

My journey began with research into Greek theatre, Japanese Noh theatre, and Yoruba Egungun masquerades.

My journey began with research into Greek theatre, Japanese Noh theatre, and Yoruba Egungun masquerades. I focused on the history of each form, the physical design and functionality of their masks, and the acting styles and conventions of each masking tradition. Next, I examined how contemporary theatrical productions use masks to gain insights from their experiences. I then looked for a text capable of playing to the strengths of each mask tradition and a cast of actors willing to experiment. Finally, I set to work on creating a structure for rehearsals and building the masks themselves. In the pages to come, I discuss my process and share what I discovered through my exploration into mask work.

Literature Review

Greek Theatre

Greek theatre was the beginning of the European theatrical canon. Most research on Greek theatre today refers to fifth century BCE theatrical practices (Patterson and Donohue 11). A large majority of the surviving evidence consists of clay vases, such as the Pronomos vase, which enables scholars to know that performers wore masks (Johnson 20). Greek theatre most likely arose from sacred rituals held in honor of Dionysus, the god of wine, fertility, and the theatre (Berberović 31). Some scholars cite the scale of the Athenian theatre as the reason for the masks, since an audience of up to 15,000 would mean that viewers could be almost 100 meters away from the stage. Masks might have carried expression out to the distant spectators better than the human face could (Wiles, *Greek Theatre* 109), and they may also have worked as a megaphone for the voice, since they covered the whole head like a helmet (Wiles, *Greek Theatre* 151). Other scholars note that Greek theatre used only three male actors to play all the roles, suggesting that they needed masks in order to switch between characters (Patterson and Donohue 26-27). The most compelling reason for the masks is that they served as a dramatic device for portraying tragedy. For translator Tony Harrison, the "mask keeps its eyes wide open when the axe blade falls, when the babies burn" (qtd. in Wiles, *Greek Theatre* 149). The horrific events of Greek tragedies became palatable with the mask. The mask created a world in which the performers could speak about the unspeakable without falling into hysterics, and, in turn, the audience could sympathize with the plight of the characters without falling into empathy. The mask afforded a degree of separation between the audience and the atrocities occurring onstage.

Photo credit: Alexi Siegel

The Greeks had a very close relationship with their masks, as the word for *mask* in Greek, *prosōpon*, was also the word for *face* (Wiles, *Mask* 1). There are large misconceptions about the appearance of Greek masks, however, The confusion stems from the common symbol for theatre: two masks, one happy and one sad. This "exaggerated and statuesque" kind of mask with dramatic facial expressions did not emerge until the Hellenistic period (323-31 BCE) and was brought into common practice by the Romans. In contrast, Greek masks were "simple and naturalistic" (Johnson 21).

They were almost expressionless and made of linen with a stiffening agent of plaster or animal glue (Wiles, *Mask* 15). These masks were not built to be durable since performers would probably wear them for only one performance before placing them in Dionysus' temple (Vervain and Wiles 255).

Taking into account the challenges inherent in the Greek theatre, such as the masks and the distance from the audience, it is no surprise that the Greek style of acting differs from most approaches today. Acting was formal and presentational, focusing on the shape of the body and how it could express emotion in an outward manner. The actors were concerned with how they could "amplify the external expression of emotion rather than draw the audience's attention toward the inner experience of a character" (Mathews 18). The Greeks were only interested in the audience's understanding of the emotions of the characters as they pertained to the plot, rather than the psychology of individual characters themselves (Vervain, "Performing Ancient Drama in Mask: The Case of Greek Tragedy" 165). The masks helped to define this style by reminding the audience "that the characters are elemental, not psychological beings" (Nightingale). Another facet of Greek theatre that enhanced this acting style was that "[t]here were no side walls to reflect sound, and a frontal delivery was therefore essential" (Wiles, *Greek Theatre* 109). For the audience to hear what they were saying, actors had to face directly out, so that each monologue might have seemed like a sort of public speech.

Acting was formal and presentational, focusing on the shape of the body and how it could express emotion in an outward manner.

Sharp body movements and vocal clarity were integral parts of Greek theatrical style. Again, the masks and the distance of the audience fed into a need for "simple, clear and bold" movements, and actors relied heavily "upon the patterns which [silhouetted] bodies made on the ground" (Wiles, *Greek Theatre* 110). The situation made it essential that "[t]he human figure becomes more indeed like a piece of sculpture, in which each line and curve complements the dominant emotion" (Walton 57). Using their entire bodies to create specific shapes, actors could communicate what their characters were feeling to the whole audience. Not only did gestures have to be easily seen by all spectators, but actors also had to be heard. Greek actors went through intensive vocal training. The plays called for the use of *stichomythia*, defined by classicist Oliver Taplin as "radically non-naturalistic," fast-moving,"single-line dialogue interchange" between speakers (236-37). Actors spoke in specific rhythmic patterns that were mirrored in music, and they needed to learn correct rhythms of speech as well as how to create a resonating sound while wearing a mask. One Greek orator, Demosthenes, is said to have "trained his voice by speaking with stones in his mouth or while running up-hill" (Wiles, *Greek Theatre* 151). Intensive breathing exercises such as these were a common training practice for actors.

Noh Theatre

Noh theatre is often compared to Greek theatre because both use choruses, masks, and music in performances. However, major differences are also present between these two art forms.

Photo credit: Alexi Siegel

Noh theatre had just started in the fourteenth century but became more popular by the end of the fifteenth century as both a public performance and an official ceremony (Hoaas 82). The protagonist is known as the *shite*, and "the events have usually happened in the distant past—indeed, in a former lifetime of the *shite*" (Mathews 16). The shite has died before the play starts and is suffering in the afterlife; the end of the play is often simply a "promise of deliverance from the tortures he is suffering" (Keene 9). The text of Noh plays is minimal, as in a Japanese haiku poem, where a "complete observation about life is concentrated," and "much is expressed by what is left out as well as by what is put in" (Devlin 59). Although long moments of silence occur onstage, characters can suggest a lot even when they do not speak.

As with the Greeks, the Japanese word for *mask*, *onote*, is also the word for *face* (Johnson 25). However, while the Greek masks were made with feeble material and used only once, Noh masks are made of wood and used for multiple plays. Even though Noh mask design is relatively "neutral and without any individualizing features" (Tamba 43), this does not mean that they are not highly expressive. Rather, "the power of the *nō* mask overall lies in its suggestiveness, hinting at the inner world of the character behind it" (Mathews 13). This suggestiveness comes from the specific

details of their carving, and how the light hitting the surface of each mask changes the way it looks. By raising the mask upwards, it appears happy, and by lowering the mask, it appears sad (Johnson 26). While there are three basic mask classifications—"the old person, the woman, and the warrior"—there is variety within the classifications, and variety in the roles that different masks are chosen for (Keene 63). Still, an actor might wear the woman mask when performing a character of a young girl in one play and then use it again to be a mother in another. The female masks especially have very blank expressions (Keene 62). Another likeness to Greek theatre is that Noh masks are paired with wigs that cover the actors' heads (Keene 65).

The acting style of Noh theatre is the complete opposite of Greek theatre because it is about the internal experience of the characters as a whole rather than their internal experience only as it pertains to the plot. The movement is slow and subtle, where "the body is bound, restricted by inaction and the actor still must project the character's feelings" (Shirō 202). Actors must keep their movement steady because quick movements are thought to be ugly. Often, "long intervals pass virtually without motion onstage, to be succeeded by brief and violent action" (Keene 10). This subtlety does not deter the audience from experiencing a highly emotional piece of theatre. Rather, the restricted body movements communicate the vast inner life of the characters because "inner turmoil is occurring" in those "who appear to be still" (Shirō 204). The body is restricted because it feels emotion so strongly. The Japanese believe that "formal movement does not prevent the expression of emotion in Noh, but becomes an aid to its controlled release" (Johnson 24). The tension provided by the prolonged expression of emotion creates an impactful experience for viewers.

Egungun Masquerades

In examining mask traditions, it was important to return to the roots of masks by examining a religious ritual. Ritual is at the center of every masked tradition, even as religion has fallen to the wayside in modern performance. Egungun masquerades are performed by the Yoruba, who "live on the west coast of Africa in Nigeria" and are one of the continent's "largest cultural groups" (Mullen 9). I chose the Egungun masquerades because, while their masks are extremely different from the Greek and Japanese traditions, the basic structure of the performances is actually very similar. Unfortunately, there is little scholarly research on this sacred religious ritual.

The Yoruba do not believe that death is the end of life; instead, people move into a spiritual world called *Orun* and watch over the living (Mullen 21). The masquerades that occur during annual festivals are a way for the living to honor their ancestors, so "in exchange for being ritually remembered, the living-dead can watch over the family and can be contacted for advice and guidance" (Strong). Performers born into the traditional Yoruba masquerade cult talk about "the spirit of the dead literally inhabiting their bodies when masked" and give advice to the living through storytelling, song, and dance (Bell, "Mask Makers in Nigeria" 42). There is a strong sense of community during the festivals, as the masquerade "supports community life, expresses local values, and contributes to its people's worldview" (Cole 37). It is a time for the community to come together to reflect on their previous year.

Photo credit: Alexi Siegel

The masks that the Egungun wear are essential for embodying their ancestors. They may be made of wood or cloth (Strong), and cloth covers the entire body, with the performers wearing gloves and leggings to ensure that no part of the skin is seen (Bell, "Mask Makers in Nigeria" 43). One reason for the full-body coverage of the Egungun masks is that the Yoruba believe that their ancestral spirits are fully covered in Orun, and therefore their physical appearance on earth should be the same (Strong). A second reason is that the masks create an otherworldly effect. John Pemberton III, a scholar of Yoruba art and rituals, observes that "because they are without the structures that shape human experience, the representation of [the ancestors'] reality—of their presence among the living—is swathed and enshrouded in layer upon layer of cloths, bird plumage, bones of animals, the skin of a snake" (43). These costumes are "in no sense portraits, but rather generic symbols of the unnamed incarnate dead" (Cole 35). They gesture at who the ancestors were, instead of trying to recreate their physical appearance.

One of the most important aspects of Egungun masquerades is that the performers transform completely into their ancestors, which they accomplish in part through their change in physicality and vocal quality. In the mask, "all traces of individuality and of time fall away" (Pemberton 46). The performers should succumb completely to the

new person they are embodying. They are even expected to disguise their voices, so no trace of themselves could be found to ruin the illusion (Strong). The vocal quality of performance is of high importance because the specific sound quality of each word is essential. Education Specialist Nicole Mullen explains that "Yoruba is a tonal language. Words must be pronounced in the appropriate tone (pitch) in order to understand speech in its correct meaning" (26). The music of the Yoruba is inspired by these tonal patterns as well (Mullen 26). This is important because Egungun masquerades include singing, music, and dance (Cole 36).

Project Design

Modern Productions of Greek, Noh, and Egungun Masks

My initial goal in researching contemporary masked productions was to understand how they use masks so that I could borrow from their practices. However, I found there are not many contemporary examples of mask work and even less explanation as to how theatre companies structure their mask rehearsals. Instead, I gained an understanding of different philosophies about how to use masks that I could apply to my own process.

Photo credit: Melissa Carter

For Greek theatre, I turned to Peter Hall and his production of Aeschylus' trilogy, *The Oresteia,* because it was performed in the Greek amphitheatre at Epidaurus as well as in the National Theatre in London and because both performances were filmed. Contemporary critics have offered mixed views of productions that endorse the classical masked traditions of Greek theatre. Arts critic Michael Billington explained in his review of Hall's 2002 *Bacchai* that he was "impressed rather than moved" because it seemed as if "Hall's production sacrifices raw power to formal purity." Similarly, reviewer Charles Spencer noted that "Hall remains wedded (perhaps that should be welded) to the convention of the mask in Greek tragedy. . . . But the masks hold the audience at a distance, turning a story as urgently topical as a newspaper headline into remote ritual." These concerns perhaps explain Chris Vervain's reference to Hall's 1981 *The Oresteia* in recounting his own approach to staging *The Bacchae* in 2010. Vervain acknowledged "that a consideration of the ancient theatre, or rather what we understand of it, can inform our practice today" but had "no intention of reconstructing ancient performance practices" ("The Masked Chorus"). For Vervain, it was more important to lean into the principles of mask work to emphasize "the physical aspects of performance" as well as the text ("The Masked Chorus").

Adjusting ancient forms for modern audiences allows for a greater cultural exchange as opposed to creating alienation.

When looking for examples of contemporary Noh theatre, I discovered a San Francisco-based theatre company called Theatre of Yugen dedicated to creating theatrical experiences inspired by Japanese theatrical styles. Like Vervain, Theatre of Yugen believes in "the evolution of live performance" and that "artistic hybridity. . . stimulates intercultural understanding" ("Our History"). In other words, adjusting ancient forms for modern audiences allows for a greater cultural exchange as opposed to creating alienation. One of Theatre of Yugen's Noh-inspired productions was called *Emmett Till, A River*, based on the story of a young African American boy killed in a hate crime. According to reviewer Ken Bullock, by "concentrating on the stillness of the stage, the voices of actors and chorus, the sounds of musical instruments, the company recreates the poetic echo chamber of a Noh play." For Bullock, the form bolsters the story and vice versa, creating an experience that both communicates a tragic story and introduces the audience to the Noh form.

When it came to Egungun masquerades, I was curious to see how much the ritual had changed over time and whether there were instances of Yoruba performers practicing their craft outside of the religious ceremony. Professor of Costume Design Deborah Bell has written several times about a man named Ojetunji Ojeyemi, who performed at the 2005 International Mask Conference at Southern Illinois University Carbondale (Bell, *Mask Makers* 20). While this was only one instance I could find of the Egungun in such a setting, I did find an article that discussed the changes occurring in modern Yoruba society in relation to the masquerades. A large change has been that religious items used to decorate the mask costume have been replaced in favor of more aesthetically pleasing design elements (Aremu et al. 285). It is unclear whether

this progression away from the tradition has been seen as positive or negative. Ultimately, I decided that the most important element of Egungun masquerades is to maintain the community it fosters in my mask work, and therefore, I could avoid the religious aspect.

My Production

The first challenge I faced in creating a masked performance was choosing a text that would work for all three mask traditions. I chose the work of playwright Charles Mee because he encourages people to "pillage" the structure and content of his poetic plays in order to build "your own, entirely new piece" (Mee). Essentially, I could freely modify or adjust Mee's texts to fit my mask work. Furthermore, Mee borrows the content for his plays from other writers, so "his plays are collage-like blends of theatrical styles and genres encompassing tragedy, romance, and farce, and incorporating music, dance, and video" ("Getting to Know Mee"). Reading through Mee's catalogue, I discovered that the blend of styles in combination with song and dance in Mee's 1996 *Life is a Dream* was perfect for my project. I was able to separate the text out into four sections that played to the strengths of each of the mask traditions. The Greek section spoke of horrific tragedies with some verse. The Noh section contained more reflective stories, where the actors could luxuriate in the subtlety of the words and movement. The Egungun section was filled with cautionary tales that could be told in a very active, dance-like manner. The last section, where I truly experimented with how masks could function using contemporary theatrical acting conventions, was simply a list of words we could experiment with as we saw fit.

I originally planned on only using one actress for the performance. I thought this would be ideal because then I could work intensively on each mask form, and rehearsals could be collaboration between the two of us. My research made clear that I needed more performers to establish a sense of community and to create masked theatre's "collective gaze of the chorus," which "directs the audience and tells them where to look" (Vervain and Wiles 262). The power of a group of masks to focus attention for the audience was too much of a dramatic convention to ignore. I also wanted to play with music underscoring text, which inherently required more people.

I was adamant that all three of my performers should be women, as women were banned in all three mask traditions that I studied. In the past, some Yoruba have gone so far as to put women to death for touching the Egungun, since women were thought to have "secret and destructive power which expresses itself in witchcraft" (Bell, "Mask Makers in Nigeria" 42). The ban against female performers seemed to stem from cultural bias rather than an actual inability for the women to perform, so I did not feel I was going against the masks by casting women. Moreover, *Life is a Dream* deals largely with the experience of women. The performance quickly became about the experience of women as the world's empathizers.

Photo credit: Alexi Siegel

Learning how to move with a mask is difficult, but it is even more challenging while simultaneously learning how to speak poetic texts in rhythm.

My rehearsal process was a month-long intensive. The first week was dedicated to bookwork and text analysis, the second to playing with the masks themselves, the third to solidifying and memorizing the text, and the fourth to combining text and mask work to create the piece itself. I decided to split up the text and mask work in the initial phase of rehearsals because of Peter Hall's advice. In her preview of Hall's 1996 *The Oedipus Plays*, Georgina Brown summarizes Hall's views: "You can't, however, short-circuit the time needed for the mask to grow up [and] therefore mask work and text work have to be done independently until a point is reached when the actors know the form and the rhythm." Learning how to move with a mask is difficult, but it is even more challenging while simultaneously learning how to speak poetic texts in rhythm. I found it necessary to divide the work until the actresses were comfortable enough with both skills. Determining how to teach my actresses to use masks presented another challenge, as I have never been formally trained in mask work. To formulate exercises I felt would build the skills necessary for each mask tradition, I pulled from a combination of sources (namely Sears Eldredge's *Mask Improvisation for Actor Training and Performance*), the training style of the Neutral Mask formalized by Jacques Lecoq, and my experiences with neutral masks during a play I directed in fall 2016.

During Greek rehearsals, I focused on how to act with outward expression, move as a cohesive choral body, sculpt the body in space, and speak in specific rhythmic patterns. The women spoke these parts in unison as a chorus. During Noh rehearsals, my object was to explore how to move with economy and stillness while still maintaining an active inner life. We played with the overlap of voices in this section as well as a more measured pace. For Egungun masquerades rehearsals, I emphasized the use of fabric in movement and in song and dance. Each woman would tell a story and the other two would sing. With the modern section rehearsals, I allowed my actresses to experiment with more pedestrian movements and to discover how the mask could influence those as well. The last week was probably the most exciting because it was when we combined both text and movement and worked on creating the framing for the final product. To that point, the actresses had worked in isolation, which meant that they could not interact as they were exploring in masks. During the final week, they were able to work off one another, and I encouraged them to experiment and play with how the masks and text interacted, as well as to discover how they might interact and inform one another. Their work improved exponentially, and—because I was building our performance masks alongside rehearsals—we were able to adjust the masks each day based on what was working best with our temporary rehearsal masks.

Photo credit: Alexi Siegel

I was excited but also terrified about creating my own masks for the piece. Since masks were at the heart of the whole project, I felt it important that my masks be very specific to our performance. However, I had no idea how to make them and have limited visual art experience. I found a material called plaster cloth, similar to the linen and glue method of the Greeks, which allowed us to mold the masks to the shape of the actresses' faces. Keeping in mind that Greek and Noh masks always had wig pieces attached to them and that fabric was an essential part of Egungun masquerades, I decided that each mask would have a fabric veil attached to its forehead, so it could serve multiple functions. We also determined in rehearsal that leaving the mouth open and cutting out the chin would allow for the best sound quality and ease of speaking for the performers.

Another challenge came in deciding what to paint on the masks, and I enlisted my friend Melissa Carter. In our first attempt, I wanted to experiment with color and texture. Each woman in my cast had made a collage of images that she felt represented her character, which we used to inspire our mask designs. We soon discovered that these masks were too busy visually, and we were losing the facial structure of the mask itself. In our second attempt, I decided to lean into the simple subtlety of Greek and Noh masks. We painted the masks with a light grey background and then dry-brushed them with pink, red, white, and copper paint in order to enhance their features. We still wanted the masks to have a bit of individuality, so we emphasized the colors differently on each mask. The women wore simple leotards and tights so they could move without restriction, and we painted their bodies with grey streaks to tie their lower halves into the masks.

The ritual of putting on a mask is extremely tender and transformative and is one of the most magical moments of mask work.

The performance itself was held in James Madison University's Wayland Hall performance space on March 19, 2017. I gave an introductory speech on the scope and purpose of the project, and then my actresses took the stage to perform *Life is a Dream*. They entered carrying their masks, briefly studied them, and then put them on in front of the audience. The ritual of putting on a mask is extremely tender and transformative and is one of the most magical moments of mask work. There is a sense that you are discovering the world for the first time as a completely different being when you begin to look around in the mask. I was privy to this discovery multiple times in rehearsal, and I wanted the audience to see the transformation. I also wanted to give the audience a chance to slowly enter the world of mask work with us and get adjusted to the masked face. Then the Noh-inspired section began, followed by Greek, then Egungun, and then finally the more modern approach. After the performance, I led a talkback with the audience to get feedback and to start a discussion about the role of masks in modern theatre.

Response and Reflections

In this section, I discuss the responses I received from my audience and my performers before reflecting on the process as a whole. For reference, I have included the

specific questions I asked my audience and performers.

Audience Response

1. What moved you, what struck you, what moments do you remember?
2. How did the mask work illuminate the text? When was it moving? When was it distracting?
3. What elements did you see of contemporary theatre in this performance? What elements could you see being used in contemporary theatre?

The audience was most excited by the transformation of the performers' bodies. The first few minutes of the performance were the most difficult for the audience members because they were still adjusting to the masks. However, the masks soon melted into the performers' bodies and were no longer distracting. The audience had a similar reaction to the fabric veils. Once the audience saw the performers interact with the veils a few times, the veils became an extension of their bodies. Furthermore, the audience was moved by the sense of unity between the three performers. The audience felt that the three performers worked together so well that they appeared to become one character, so it seemed like they would have been able to switch places at any time and still continue the story. Indeed, my audience noted that the performers' were clearly in tune with one another's bodies, and they spoke and moved as if they were one body. Building an ensemble is an important part of theatre today, and my audience noted that the masks appeared to be critical in bonding the performers, so that they were able to react honestly to one another. Respondents also said that the performers' physicality was highly detailed. They used every inch of their bodies to communicate throughout the entire performance. Another observation was that the mask work seemed to awaken the performers' sensibilities; they appeared more physically live and present even after they took off their masks.

Performer Response

1. How did this experience compare to other roles you have prepared for?
2. How did your relationship to the text change while working with the mask?
3. How did the mask impact your connection to one another as performers?
4. How did the mask awaken your body as a communication tool? What was the experience like not being able to rely on your face as a communication tool?
5. Which exercises did you find most helpful?
6. Which exercises were you confused by? Which exercises needed additional instructional support to them?
7. Did you feel like you had a strong understanding of the purpose of the project as a whole?

The performers found that their bodies reacted strongly to the masks. They felt a need to push beyond the masks that covered their faces, to bring all expression and meaning into their delivery of words and body movement. This forced them to find more meaning and connection to the text itself and unlocked their bodies to move in new ways that could teach them more about the text and themselves. Moreover, the masks separated the performers from their characters. They reported that having their faces covered detached them from the situation, making it easier to step into someone else's shoes. Put differently, their masks took them away from who they were as humans or who they "should be," freeing them to explore whatever they felt. My performers endorsed masks as an amazing rehearsal tool, a bridge between exploration and performance of a text.

Working together was clearly their favorite part of the process. Getting to see another person in a mask created a world where any movement was acceptable, which allowed them to physically open up. Equally importantly, they said that the masks joined them together to almost create one body, one woman, telling a story. It became less about the individual and more about the story and how they could use each other to convey it.

Photo credit: Alexi Siegel

My Response

I still have much to learn when it comes to masks, but this was a step in the right direction. Not only did I get to explore three different styles of acting with masks at once, but I also experimented briefly with how masks might be used in tandem with contemporary acting styles. I loved testing my way through mask work with my performers, and by the last week of rehearsals, I had gained a much deeper understanding of the strengths and weakness of the masks. For example, we learned quickly that tilting the chin too far up or down breaks the illusion of the mask. I could never have found such an apparently simple insight like this in any textbook or article about masks. We had to uncover it ourselves by actively working with masks. Our rehearsals were full of this trial and error. I could lead my actresses through multiple activities I had prepared, and then we could discuss at the end of that rehearsal what the

mask helped them learn and what was confusing. From then on, I was able to adjust our rehearsal plans.

In performance, the Noh-inspired section felt truly unsuccessful, as we could not achieve the necessary clarity of movement and tension in the body. When each movement is so small and slow, it must be perfectly defined; if it is not, the meaning becomes muddled. I think that we did not have the time to train and practice moving economically while also keeping tension in the body. Despite our inability to master Noh's subtle techniques on a tight schedule, I believe Noh mask work can be as successful as the other two forms for a contemporary audience.

Photo credit: Alexi Siegel

This moment and its one simple gesture encapsulates the reason I love masks and believe in their power.

During the Greek, Egungun, and contemporary sections, the women were completely transformed. They developed a strong relationship with one another, their bodies, and the text, and therefore communicated a breathtaking story. My favorite moment of the performance was when the women said their last three lines: "The sunlight you see in water as you pour it from a pitcher into a bowl. / The earth itself. / Dirt." They pulled their veils up and over their masks and let them cascade down in front of them. The fabric was long enough that it covered a large portion of their bodies. This moment and its one simple gesture encapsulates the reason why I love masks and believe in their power. It is the moment when the performance stops being about the masks themselves and becomes about the whole body being able to express something in complete unity. The body itself becomes a mask, capable of revealing so much expression if individuality and ego gets put aside.

Conclusions

I began this project hoping to answer two questions. First, what is the role of masks in theatre today? Second, how can a director use ancient mask traditions to inspire new work? I discovered three major benefits to using mask work, along with a general guideline for directors.

1. Masks help to build strong ensembles by removing the ego of the individual performer.
2. Masks unlock the full expressive range of the human body.
3. Masks allow the performers and the audience to experience a more universal expression of humanity onstage.
4. Contemporary masked theatre should not attempt to replicate past masking traditions but rather should allow the form and the masks to evolve along with the humans who use them.

The human body is capable of unbelievable expression. Masks facilitate this expression by removing the ego of performers, helping them to both become present in their bodies and to transform into a completely different type of being. Moving forward, it is important for theatre artists to continue bringing masks out of antiquity. However, adhering too strictly to the ways artists used masks in the past would be a detriment to modern theatre and to masks themselves. Masks are an unbelievably powerful tool for contemporary theatrical practice and contemporary theatre artists. They strip us down to the raw expression of the human body. In this state, we can communicate truths not just specific to the performer or character but to the human experience itself.

Photo credit: Melissa Carter

Author's Note

Alexi Siegel graduated magna cum laude in 2017 with a degree in Theatre Education. She has since returned to her home in Chicago, Illinois, to work at Steppenwolf Theatre Company in their Apprenticeship program as a Scenic Carpenter. She hopes to learn as much as she can about professional theatre before returning to the classroom to pass that knowledge on to her students. Ms. Siegel believes that theatre is the greatest tool for teaching empathy, and that empathy is the greatest tool in the world.

"Masks: A New Face for the Theatre" builds on a Creative Honors Capstone project that Ms. Siegel presented to the faculty of James Madison University's School of Theatre and Dance in May 2017. Ms. Siegel is grateful to Dr. Ingrid De Sanctis for her brilliant and loving guidance throughout the process and to Professors Ben Lambert and Zachary Dorsey for their support as readers. Melissa Carter—friend, photographer, painter of masks—also deserves thanks.

A photo gallery of images taken during rehearsals, mask building, and the performance is available at https://www.flickr.com/gp/149465887@N08/B38536.

A video of the performance is available at https://youtu.be/zomQ47m9e5o.

Photo credit: Alexi Siegel

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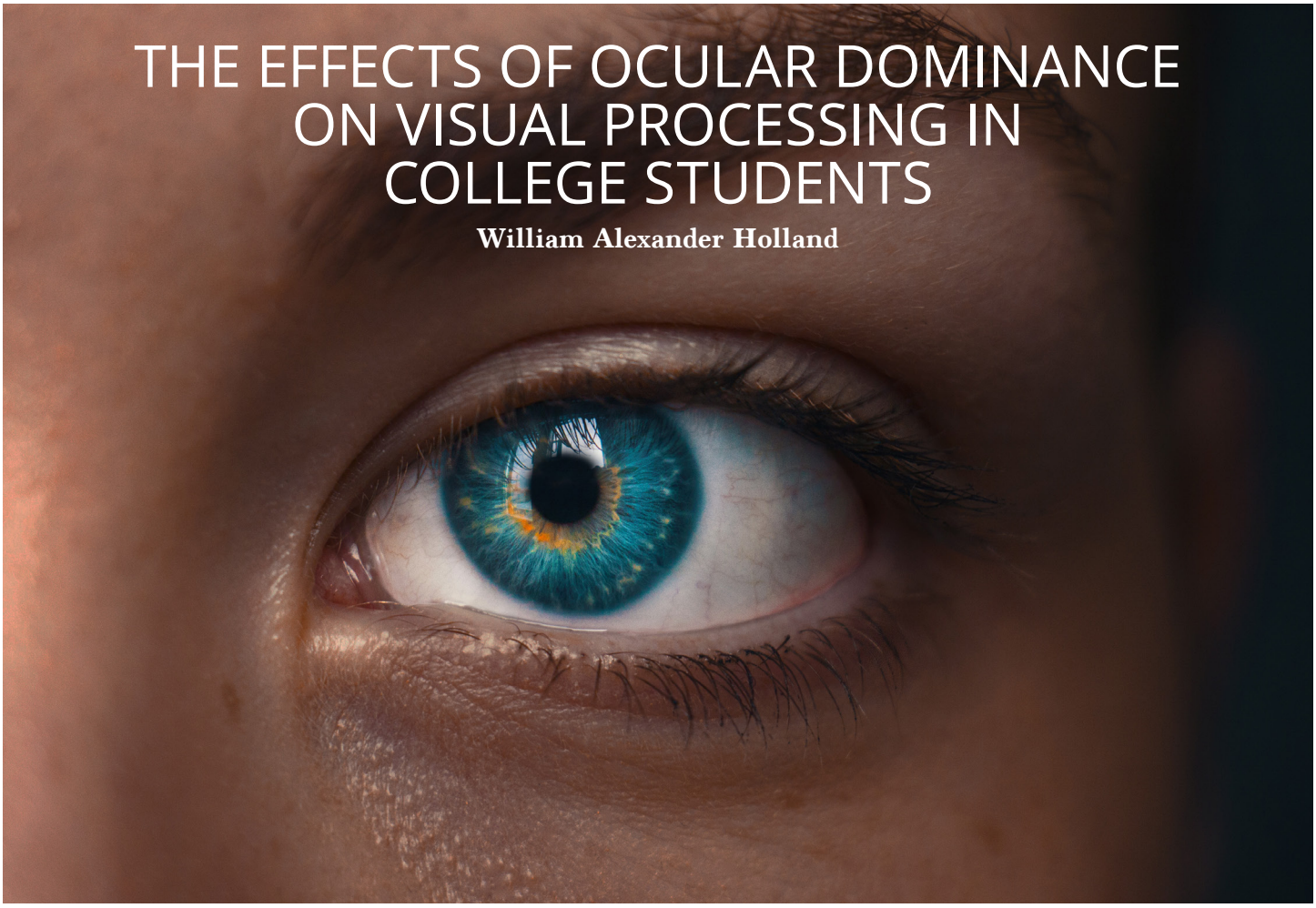
THE EFFECTS OF OCULAR DOMINANCE ON VISUAL PROCESSING IN COLLEGE STUDENTS

William Alexander Holland



ABSTRACT

The role of ocular dominance in processing visual memory and analytic tasks is unknown. Research has variably showed both significant effects and no effect of ocular dominance on visual perception, motor control, and sports performance. The goal of this study was to determine if there is a relationship between ocular dominance and visual processing under a variety of computer gaming tasks. This was accomplished by first determining subjects' ocular dominance through the Miles test, and then examining the subjects' visual performance on four different Lumosity games under three conditions: left eye, right eye, and both eyes. Results suggest a relationship between ocular dominance and score in the simplest game used, named Raindrops, but did not identify a relationship between ocular dominance and accuracy. The study did not suggest a relationship within any of the other games that measure a variety of different abilities. It is possible a relationship between ocular dominance and score in the game Raindrops may have been due to the simplicity of the task. A small sample size (n = 20) may have also contributed to the inability to detect significant effects. Future studies incorporating larger sample sizes might focus on ocular dominance as it relates to simple arithmetic tasks.

Throughout history, it has been appreciated that a person may be more adept with one hand than the other. Most people have either a dominant right or left hand; few are equally adept with both hands (Llaurens, Raymond, & Faurie, 2009). More recently, it has become clear that humans also preferentially use one eye over the other, known as ocular dominance (Miles, 1929). It is unclear, however, whether the dominant eye processes or perceives visual information better than the other eye. The goal of this study was to determine if there was any relationship between ocular dominance and visual processing under a variety of computer gaming tasks.

Visual System

Ocular dominance arises from the anatomical and physiological organization of the visual system. The eye consists of the pupil, iris, cornea, sclera, and retina. The pupil is a small black-looking aperture in the center of the eye which admits light. The iris is a circular pigmented muscle that regulates how much light is transmitted through the pupil by controlling the pupil's size; the iris also gives the eye its color. The cornea is the outside layer of the eye covering the iris and pupil, and its purpose is to work with the lens to generate a sharp image at the retinal photoreceptor layer on the inner surface of the eye. The sclera is the supportive wall of the eye. Regarding the neural elements, the retina is the inner lining of the eye where neurons and photoreceptors (structures sensitive to light) are located. The retina consists of three layers: the outermost containing rod and cone photoreceptors, which, respectively, allow for monochromatic and color vision. The middle layer contains bipolar cells which process and convey signals from the photoreceptors to the ganglion cells in the innermost layer. The ganglion cells, in turn, project through the optic tract to the lateral geniculate nucleus (LGN) in the thalamus (Nelson, 2007).

The LGN, located in the dorsal thalamus of the brain, consists of two lobes: the right LGN and the left LGN. Each half of the LGN is made up of six layers; half of these layers receive input from the nasal medial retinas, and the other half receive input from the temporal lateral retinas. Neurons in the LGN transmit sensory information to the primary visual cortex (Bear, Connors, & Paradiso, 2016).

The primary visual cortex, also known as the striate cortex, is located in the occipital lobe of the brain. The primary visual cortex is the primary synaptic target of the LGN. The primary visual cortex is also made up of six layers, and Layer 4 is divided into three parts. Layer 4C is different from the other layers of the primary visual cortex in that it receives synaptic input from only the contralateral eye. The other layers of the primary visual cortex receive input from both eyes (Bear et al., 2016). The secondary visual cortex, also known as the pre-striate cortex, processes visual information from the primary visual cortex. The secondary cortex differs from the primary cortex in that more complex features of the visual scene are recognized, perhaps also leading to visual memories. The secondary visual cortex also sends input back to the primary visual cortex (Gazzaniga, Ivry, & Mangun, 2002). The associative cortex includes most of the cerebral cortex and is responsible for the complex processing that underlies the integration of multi-sensory information, the control of movement, and conscious behavior. The parietal association cortex in particular is responsible for responding to complex stimuli in the internal and external environment, and the frontal associative cortex may be important for planning behavior in response to stimuli (Purves et al., 2001).

Ocular dominance must arise from the separate processing of information from each eye. Therefore, it is relevant that information from the left and right eye remains at least partially separate up through the primary visual cortex. In particular, there are ocular dominance columns in the primary cortex that may mediate monocular processing, such as depth perception and possibly ocular dominance (Barrett, 2016; Miller, Keller, & Stryker, 1989).

Ocular Dominance

Ocular dominance is defined as the preference of one eye over the other for sight or the favoring of one eye when there is conflicting information being presented to both eyes (Coren & Kaplan, 1973). The term ocular dominance was first coined in 1593 by Porta, who suggested that if people are right-handed and right-footed, then they are necessarily right-eyed. Much more recently, researchers have established that there is not a direct relationship between the dominant eye and the body's limbs (Coren & Kaplan, 1973).

Coren and Kaplan (1973) used 13 different methods to test for ocular dominance, including pointing, alignment, the hole test, the Ascher test, and the Miles ABC test. The authors argued that ocular dominance is a complex phenomenon consisting of three different types of ocular dominance: sighting, sensory, and acuity dominance. In contrast, Barrett (2016) was skeptical that the phenomenon of ocular dominance could be clinically demonstrated, pointing out the lack of agreement between the various tests of ocular dominance. For example, there were inconsistencies in test results for the same individual, which further complicated findings.

Most humans have a dominant eye, which is typically the right eye. Miles (1929) tested 172 grade school children. Of these, 61% were right-eye dominant and only 22% were left-eye dominant. The remaining 17% showed inconsistent dominance or no dominance. Similarly, Roth, Lora, and

Heilman (2002) found that right-eye dominance is more common than left-eye dominance in terms of demographics, and Porac and Coren (1976) showed that right-eye dominant individuals make up between 65% and 70% of the population. There is evidence that ocular dominance may have a genetic basis. Using a mathematical model, Annett (1999) suggested that genetically-linked asymmetry in humans may account for right-sidedness above the 50% that would be expected by chance. Similarly, Annett's results indicate a positive correlation between handedness and eye preference.

It is generally believed that binocular (two-eyed) vision is superior to monocular (one-eyed) vision, even when subjects use their dominant eye. Subjects may perform better at tasks involving tracking moving objects with binocular vision as opposed to monocular vision (Madan, 1980). It is also known that fatigue under binocular and dominant monocular eye viewing conditions is less pronounced than in non-dominant monocular viewing conditions, and that subjects may perform better at tasks involving tracking moving objects with binocular vision as opposed to monocular vision (Madan, 1980). However, while past research suggests performance in the dominant eye will surpass the non-dominant eye when ocular dominance is pronounced, it is still not totally understood how ocular dominance relates to visual processing because performance varies, depending on the task at hand.

Ocular Dominance & Visual Motor Performance

Color vision may vary between dominant and non-dominant eyes. Gundogan, Koçtekin, and Altintaş (2016) found that color perception error scores were lower in dominant eyes versus non-dominant eyes for red/green discrimination. However, eye dominance had no effect on blue/yellow discrimination. Thus, when the subjects used their dominant eye, they perceived the red/green color better than with their non-dominant eye. Ocular dominance displayed no effect on perception of blue/yellow colors (Gundogan, Koçtekin, & Altintaş, 2016).

The phenomenon of saccades is critically important for visual orientation and balance. Saccades are rapid eye movements that change a point of fixation quickly and abruptly (Purves et al., 2001). Tagu, Doré-Mazars, Lemoine-Lardennois, and Vergilino-Perez (2016) report that in binocular tasks, subjects with more pronounced ocular dominance showed greater amplitude of saccades toward a target. Furthermore, performance was better for saccade target locations contralateral to the dominant eye (Tagu, Doré-Mazars, Lemoine-Lardennois, & Vergilino-Perez, 2016).

Lateral eye movements, which are a reaction to distracting stimuli, also vary with ocular dominance. In Borod, Vingiano, and Cytryn's (1988) research on lateral eye movements and emotion, they found that non-emotional tasks yielded right-lateral eye movements in right-eye dominant subjects, while the same non-emotional tasks yielded left-lateral eye movements in left-eye dominant individuals. For emotional tasks, no statistically significant difference was found between the two ocular dominance groups.

In humans, the dominant eye not only processes more information than the non-dominant eye, but it may also inhibit perception of items from the non-dominant eye (Madan, 1980; Shneor & Hochstein, 2006).

Hand-eye coordination relies on both ocular dominance and visual processing. Because hand-eye coordination is an important determinant of sports performance, much of the literature on ocular dominance in sports is related to testing hand-eye coordination (Laby & Kirschen, 2011).

Ocular dominance can affect performance in sports. Steinberg, Frehlich, and Tennant (1995) compared the golfing success of two groups: cross dextral golfers (right-handed with left-eye dominance) and pure dextral golfers (both right-eye dominant and right-handed). The study concluded that pure dextral golfers have a statistically significant advantage over cross dextral golfers in putting accuracy.

There is also evidence that ocular dominance may play a critical role in reaction time. Chaumillon, Blouin, and Guillaume (2014) showed that the time required for cross and pure dextral subjects to press a button in response to a lateralized visual stimulus was faster for pure dextral subjects than their cross dextral counterparts.

Spatial perception performances may also vary between left- and right-eye dominant subjects. Roth et al. (2002) showed that right-eye and left-eye dominant groups may differ in spatial perception. Left-eye dominant individuals exhibited a bias toward near space in their right visual fields and toward far space in their left visual fields. Another study also suggests a difference in spatial perception between right-eye dominant and left-eye dominant individuals by showing that right-eye dominant subjects walking through a doorway shifted their position away from the center of that doorway when the right eye was covered. In contrast, left-eye dominant individuals with left-eye occlusion yielded a less significant result (Kitayama, Fujikake, Kokubu, & Higuchi, 2014). Although there are conflicting results, previous research demonstrates that the dominant eye can be superior to the non-dominant eye for diverse visual and motor tasks. However, there is no evidence that eye dominance influences visual memory and arithmetic processing.

Development

Research has shown that in mammals, ocular dominance develops early in life (Sanes & Jessell, 2013). Ocular dominance cannot be inhibited or changed after a specific critical period early in a mammal's development. In mice, cats, and monkeys, closure of an eye during the critical period for ocular dominance markedly shifts the preference of binocular neurons to inputs from the the other eye. Closure before or after the time of this normal critical period, however, fails to alter the preference of the neurons. Furthermore, performance in ocular dominance cannot be changed in adults by monocular occlusion (Sanes & Jessell, 2013). It is also known that subjects will tend to perform better at visual tasks with binocular vision even after monocular occlusion has been introduced for a period of up to five days (Sheedy, Bailey, Buri, & Bass, 1986).

Specific Aim

Given the lack of research on the effects eye dominance has on visual memory and simple analytic processing, the primary objective of this study was to determine if ocular dominance influences performance on different computer gaming tasks that draw on different aspects of visual memory and analytic processing. This goal was achieved by comparing performance in four Lumosity games which relied on visual memory and analytic processing for three visual conditions: dominant eye, non-dominant eye, and binocular vision.

Methodology

Approvals

Institutional Review Board (IRB) approval was received on November 3, 2016. Permission was obtained from Lumos Labs, Inc. on November 4, 2016, to use specific games featured on the website www.lumosity.com. Participants were required to sign an IRB-approved consent form.

Participants

Undergraduate participants (n = 20) were recruited from Spring 2017 STEM classes, a Spring 2017 Math Club meeting, and/or through personal invitation. The time of day students participated in the experiment varied due to school conflicts. Participants ranged from 18 to 26 years of age.

Determining Ocular Dominance

To determine subjects' ocular dominance, the Miles Test for Ocular Dominance (Miles, 1929) was used. The Miles Test asks subjects to form an aperture with their hands and then to focus their attention on an object, in this case either a red or green target on a whiteboard 2.5 meters away. The object subjects focused on was not as relevant as their distance away from the object. Subjects were then asked to close one eye at a time to report the eye in which the object shifted. Subjects who reported a shift in their left eye were classified as right-eye dominant, and subjects who reported a shift in their right eye were classified as left-eye dominant. Subjects who reported no shift in either eye were classified as having no eye dominance.

Measuring Mental Processing Ability

All tests of visual mental processing ability used the Lumosity program. After eye dominance was recorded, the participants played four different Lumosity games that test different abilities within mental processing. The four games are titled as follows: Raindrops, Disillusion, Chalkboard Challenge, and Memory Matrix. All subjects participated in the games in this order. Before testing in a specific game began, all subjects were asked to participate in a practice session of the game in which they were being examined to acquaint them with the rules and play of the game. Practice sessions were similar to the actual tests, but the subjects had both eyes open. Practice sessions lasted as long as the scored sessions. No data was recorded during these practice session. The practice session for Memory Matrix was designed to determine at what level the subject should start the game. An eye patch was used to examine visual mental processing ability in a specific eye during the recorded testing. All subjects were asked to play each of the four games with their right eye covered, their left eye covered, and with both eyes open. The sequence in which eyes were covered was randomized for each game.

Raindrops

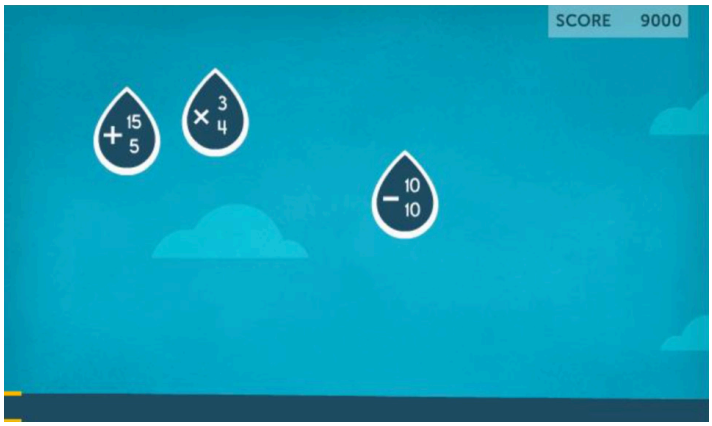


Figure 1. A representation of what subjects were expected to accomplish in the game Raindrops. Specific scores such as accuracy or total problems solved are shown after the trial is complete.

The first game the subjects were asked to play was Raindrops, which focuses on basic arithmetic ability (Figure 1). The objective of this game is to complete basic arithmetic questions inside of raindrops before they drop to the bottom of the screen. Subjects had a sufficient amount of time to play this game, until the "raindrops" reached the bottom of the screen three times. However, the experimenter requested the subjects to stop playing if they exceeded the time limit

permitted by the IRB. A maximum of five minutes was allowed for each trial. The difficulty of the game progressed as the subjects completed more arithmetic questions. Because of the difficulty level, the experimenter was never required to ask the subjects to cease playing because the subjects lost the game before reaching the maximum time limit. The total number of questions answered correctly in each trial, the time it took for the subject to complete each trial, and the accuracy of the subject in each trial were all recorded.

The second game that subjects were asked to play was Disillusion, which focuses on subjects' ability to visually process and change tasks within a set time (Figure 2). Subjects had up to 60 seconds to complete this game. The objective of this game is to match puzzle pieces based on their color if the piece is vertical, and based on their symbol if they are horizontal. The puzzle pieces are then cleared from the board once the players match them. This process was repeated four times with four different boards until the subject cleared all the puzzle pieces on each board. If the player matches the puzzle piece with an incorrect piece on the board, there is a delay in time between boards and a delay for the space in which the player selects the incorrect piece. Players can clear as many as three puzzle pieces at a time when correctly matched. The subject's total number of pieces correctly matched and the amount of time taken for each respective trial were recorded.

Figure 2. A representation of what subjects are expected to accomplish in the game Disillusion. The time and score are indicated in the upper right-hand corner of the screen.

The third game subjects were asked to play was Chalkboard Challenge, which also focuses on basic arithmetic ability but may additionally test the subject's field of vision (Figure 3). The objective of this game is to indicate which of two basic mathematical quantities is greater using only the left, right, and down arrow keys on the subject's keyboard. Respectively, the left arrow key indicates that the left quantity is larger, the right arrow key indicates that the right quantity is larger, and the down arrow key indicates that both quantities are equal. The player begins with a time of 50 seconds to complete the questions presented. Like the Raindrops game described earlier, Chalkboard Challenge increases in arithmetic complexity as the subject progresses. The difference is that, unlike Raindrops, the actual complexity of the mathematical quantities in Chalkboard Challenge increases instead of the amount of questions presented or the speed at which they are expected to be answered. For every three quantities that the player correctly classifies as greater or equal, the questions increase in difficulty and 10 seconds is added to the player's time. If the player identifies the quantities incorrectly, 3 seconds are deducted from the player's time left. The subject's total number of correctly identified quantities for each trial, the time the subject took for each trial, and the accuracy of the subjects during each trial were recorded for this game.

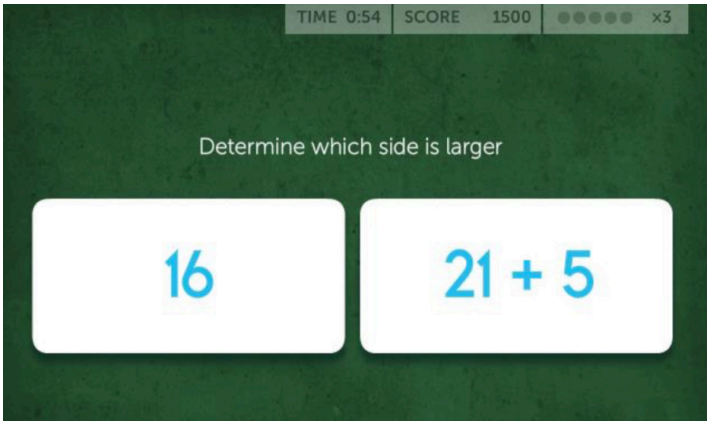


Figure 3. A representation of what subjects are expected to accomplish in the game Chalkboard Challenge. The two quantities that the subject is expected to identify as greater than, less than, or equal to are located in the center of the screen.

The last game subjects were asked to play was Memory Matrix, which focuses entirely on the subject's ability to process and remember a pattern of tiles (Figure 4). The objective of this game is to memorize a pattern of tiles in roughly 1 second and then match the tiles on a board exactly as they had been presented. The game increases in difficulty after every two boards the player memorizes entirely. With each level in difficulty, the game adds an additional tile for the player to memorize. The game begins with three tiles for the player to memorize but then changes depending on how well the player performs in prior trials. This made a practice session compulsory because the practice session sets the difficulty of the initial board. If the player does not match every tile on the board exactly as it was shown, the game will not add additional points to the player's score. The game will also not increase in difficulty if the player makes an error. If the player fails to memorize all the tiles presented for two trials in a row, the game decreases in difficulty by removing a tile that the player needs to memorize. The game requires the player to complete 12 of these trials per game, meaning that the subject attempted to memorize a total of 48 boards throughout the course of the experiment. The first 12 boards were part of the practice tests, and the

other 36 were divided between testing with the left eye, the right eye, and both eyes. The subject's score for each set of 12 trials as indicated by Lumosity, "best board" on all 12 trials, and total time taken for each set of 12 trials were recorded for this game.

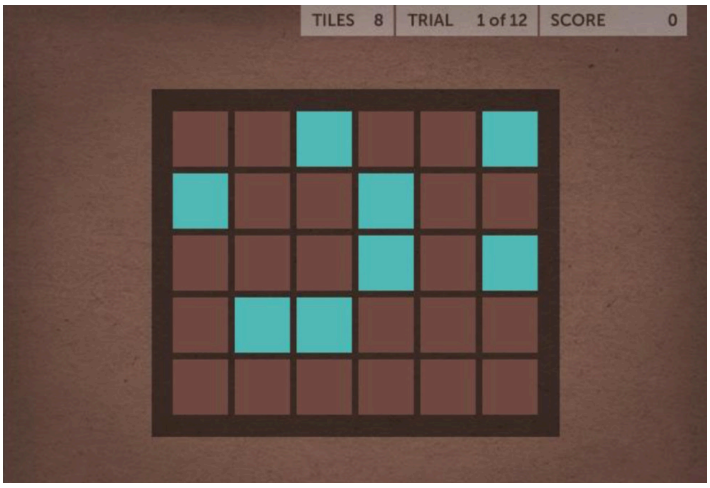


Figure 4. A representation of what subjects are expected to memorize in the game Memory Matrix. The number of tiles shown, the trial, and the score appear in the upper right-hand corner of the screen.

Data Analysis

As there was a non-normal skewing of scores on all tests, box and whisker plots were used to plot the data (Figure 5A-8B). Boxplots show the median, 25th and 75th percentiles, and 5th and 95th percentiles, as well as all individual data points. The non-parametric Friedman Repeated Analysis Measures on Ranks was used for inferential testing in all tests in all four games because of the within-subject design and non-normal distribution of scores. An α of 0.05 was used as the criterion for significance. Data was managed in Microsoft Excel, and statistics and graphics were computed in Systat Sigmaplot.

Results

The purpose of this study was to determine whether there was a relationship between ocular dominance and visual processing. Subjects with ocular dominance (n=19) performed four different games: Raindrops, Disillusion, Chalkboard Challenge, and Memory Matrix, which were played under three conditions: left eye closed, right eye closed, and both eyes open. Ocular dominance was split almost equally between the subjects with 9 having left-eye dominance and 10 having right-eye dominance

The first game evaluated was Raindrops, which measured the visual arithmetic ability of the subjects. Figure 5A shows that the total number of correct responses was significantly affected by eye group (P=0.01, Friedman) and that the scores were greater for the dominant eye compared to the non-dominant eye (P<0.05, Tukey) but not both eyes. However, accuracy in the Raindrops game (Figure 5B) was not significantly affected by eye group.

Two box and whisker plots display both the number correct and accuracy for subjects' dominant eyes, non-dominant eyes, and both of their eyes on Raindrops. Statistical analysis for both number correct (A) and accuracy (B) used a sample size N = 19. The dominant eye yielded a median of 59 correct, a lower quartile of 46 correct, and an upper quartile of 67 correct. The non-dominant eye yielded a median of 49 correct, a lower quartile of 38 correct, and an upper quartile of 73 correct. Data from both eyes yielded a median of 48 correct, a lower quartile of 38 correct, and an upper quartile of 65 correct. The Chi-Squared value = 8.41 with 2 degrees of freedom and P = 0.015 indicated that the differences in the median values among the treatment groups were greater than would be expected by chance. A post-hoc Tukey test revealed that the median score for the dominant eye was greater than for the non-dominant eye (P<0.05) but not both eyes. In terms of accuracy, the dominant eye yielded a median of 93%, a lower quartile of 90%, and an upper quartile of 95%. The non-dominant eye yielded a median of 92%, a lower quartile of 87%, and an upper quartile of 95%. The data from both eyes yielded a median of 94%, a lower quartile of 92%, and an upper quartile of 96%. There was no statistically significant difference as P = 0.45. The power of the performed test was 0.049.

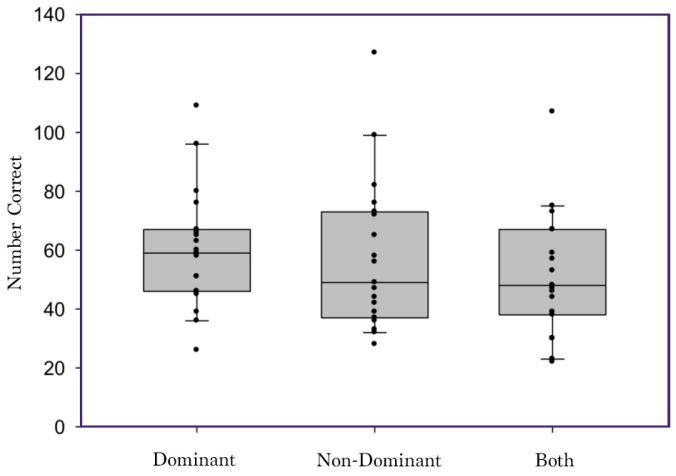


Figure 5A. Raindrops: total number of correct responses by eye group.

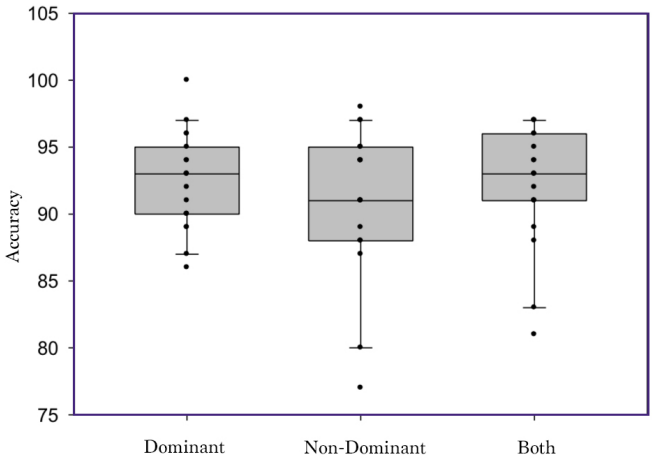


Figure 5B. Raindrops: accuracy by eye group.

The second game evaluated was Disillusion, which measured the subjects' ability to visually switch tasks. The subjects switched tasks by matching changing puzzle pieces to a board. Figure 6 shows that the number of correctly matched puzzle pieces was not significantly affected by eye group (P=0.90, Friedman).

A box and whisker plot of the subjects' number correct in their dominant eye, non-dominant eye, and both of their eyes for game 2, Disillusion. Statistical analysis for the number correct used a sample size of N = 19. The dominant eye yielded a median of 25 correct, a lower quartile of 22 correct, and an upper quartile of 31 correct. The non-dominant eye yielded a median of 25 correct, a lower quartile of 19 correct, and an upper quartile of 28 correct. Data from both eyes yielded a median of 24 correct, a lower quartile of 22 correct, and a upper quartile of 28 correct. There was no statistically significant difference as P = 0.90. The power of the performed test was 0.049.

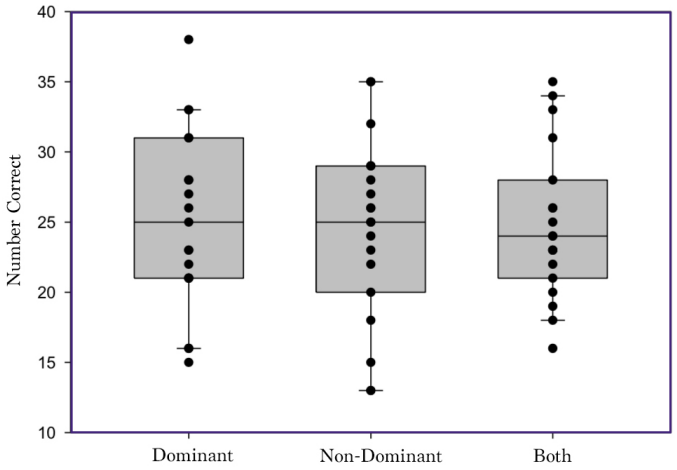


Figure 6. Disillusion: ability to switch tasks by eye group.

The third game evaluated was Chalkboard Challenge, which also measured the visual arithmetic ability of the subjects. Figure 7A reveals that the number of correctly identified greater quantities was not affected by eye group (P=0.99, Friedman). Figure 7B displays that the accuracy in terms of correctly identified greater quantities was also not affected by eye group (P=0.85, Friedman).

Two box and whisker plots which display both the number correct and accuracy for subjects' dominant eyes, non-dominant eyes, and both of their eyes for game 3, Chalkboard Challenge. Statistical analysis for both number correct (A) and accuracy (B) used a sample size of N = 19. The dominant eye yielded a median of 30 correct, a lower quartile of 26 correct, and an upper quartile of 35 correct. The non-dominant eye yielded a median of 30 correct, a lower quartile of 25 correct, and an upper quartile of 38 correct. Data from both eyes yielded a median of 28 correct, a lower quartile of 25 correct, and an upper quartile of 40 correct. There was no statistically significant difference as P = 0.99. The power of the performed test was 0.049. In terms of accuracy, dominant eye yielded median of 91%, a lower quartile of 84%, and an upper quartile of 94%. The non-dominant eye yielded a median of 88%, a lower quartile of 86%, and a upper quartile of 94%. The data from both eyes yielded a median of 88%, a lower quartile of 85%, and an upper quartile of 93%. There was no statistically significant difference as P = 0.85. The power of the performed test was 0.049.

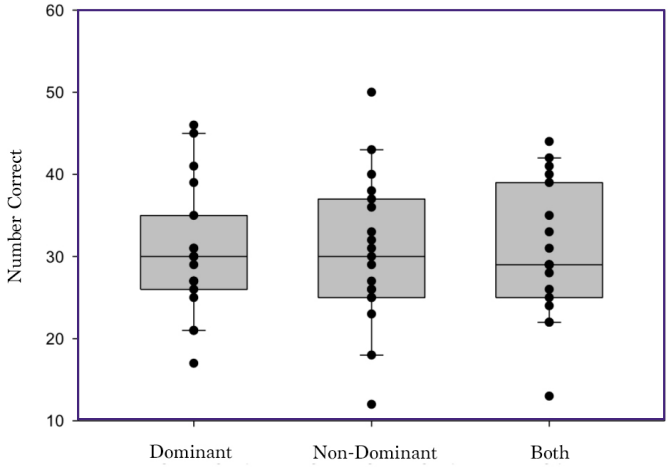


Figure 7A. Chalkboard Challenge: number of correctly identified quantities by eye group.

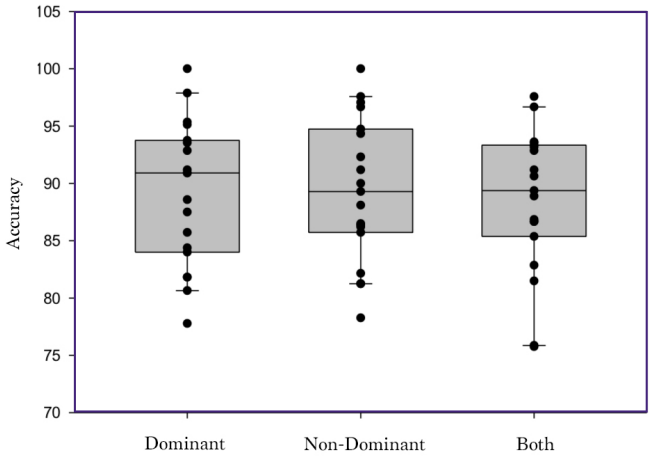


Figure 7B. Chalkboard Challenge: accuracy in identifying quantities by eye group.

The fourth game evaluated was Memory Matrix which measured the subjects' capacity to remember quantities of tiles in various patterns. Figure 8A shows that the subjects' best board, or largest quantity of memorized tiles in a single trial, was not affected by eye group (P=0.17, Friedman). Figure 8B shows that the subjects' scores as indicated by the Lumosity interface was also not affected by eye group (P=0.85, Friedman).

Two box and whisker plots which display both the best board and score on Lumosity for subjects' dominant eyes, non-

dominant eyes, and both of their eyes for game 4, Memory Matrix. Statistical analysis for both best board and score on Lumosity used a sample size of N = 19. The average best board for the dominant eyes yielded a median of 10 tiles, a lower quartile of 8 tiles, and an upper quartile of 13 tiles. The non-dominant eye yielded a median of 10 tiles, a lower quartile of 9 tiles, and an upper quartile of 13 tiles. Both eyes yielded a median of 10 tiles, a lower quartile of 9 tiles, and an upper quartile of 13 tiles. There was no statistically significant difference as P = 0.17. The power of the performed test was 0.071. The dominant eyes yielded a median score of 31,000, a lower quartile of 24,000, and an upper quartile of 37,500. The non-dominant eye yielded a median score of 28,000, a lower quartile of 26,000, and an upper quartile of 33,500. Both eyes yielded a median of 30,000, a lower quartile of 24,500, and an upper quartile of 34,500. There was no statistically significant difference as P = 0.32. The power of the performed test was 0.072.

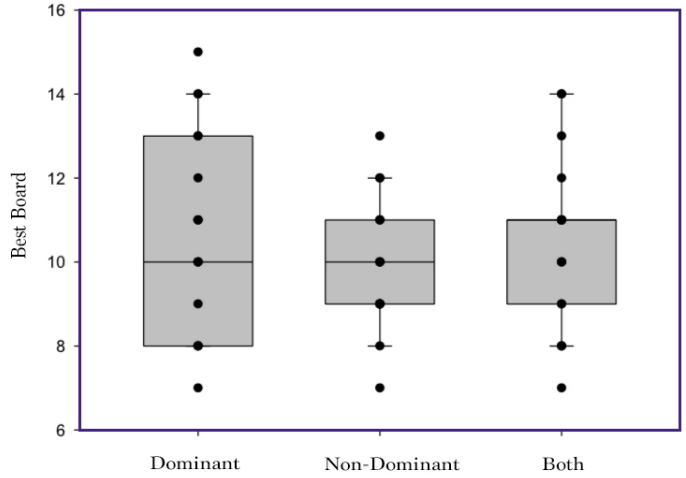


Figure 8A. Memory Matrix: quantity of memorized tiles by eye group.

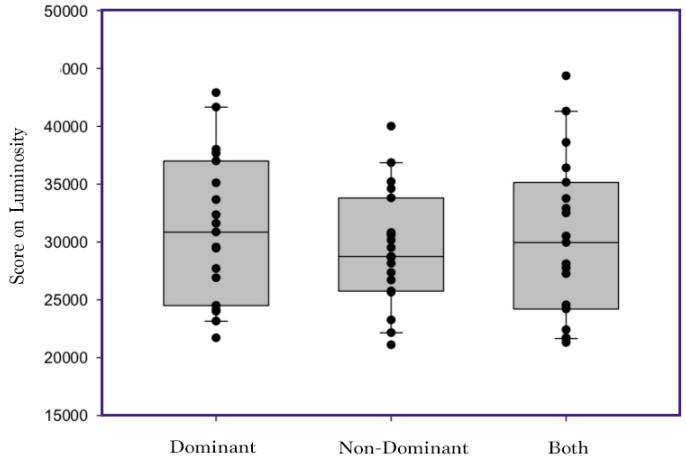


Figure 8B. Memory Matrix: scores by eye group.

In order to determine whether the sample size was adequate to reveal differences between eye groups, a power analysis was performed for all four games. The powers of the four games were 0.048, 0.048, 0.048 and 0.17, which were less than the typically desired 0.8.

Discussion

Summary

The goal of this project was to determine whether subjects who used only their dominant eye in computer games scored differently than when those same subjects that only used their non-dominant eye or both eyes. Across all four games, in only one game did subjects score better with their dominant eye than with their non-dominant eye. In the Raindrops game, which tested simple arithmetic ability, subjects who used their dominant eye scored significantly higher than subjects who used their non-dominant eye but the same as subjects who used both eyes. In contrast, the eye dominance was not significant in the other three games that tested complex arithmetic ability, task switching, and memory. This suggests ocular dominance may preferentially benefit simple arithmetic visual tasks. However, low power suggests a greater sample size may have been needed to detect differences in the other three games. In a relatively small statistical sample, one subject displayed no preference for either eye. A future study to test cognitive abilities of individuals possessing no eye dominance compared to those with eye dominance might reveal advantages or disadvantages for students with this trait. Future studies might also focus on ocular dominance as it relates to simple arithmetic tasks as my study indicated a correlation between the aforementioned variables. These new studies may also include a larger sample size than the one used in my experiment.

Comparisons with Previous Studies

Previous studies have shown mixed effects of ocular dominance on performance. While research across sports (Steinberg, Frehlich, & Tennant, 1995), visual perception, and eye movement have revealed the effects of eye dominance, other similar studies (Laby & Kirschen, 2011) have shown little evidence of the effect of ocular dominance on their examinations. Similarly, my results have shown that ocular dominance had little effect on subjects' performance on most, but not all, of the Lumosity games.

Interestingly, most previous studies assessed the role of dominance or non-dominance performance indirectly. My studies directly assessed the role of ocular dominance on task performance. For example, one study conducted by Shneor and Hochstein (2006) measured their result on the observation of distractor elements whereas my study examined raw performance. Their study tested the effects of ocular dominance on performance in a feature search where subjects would be given a visual target to look at and distractor targets designed to distract their visual attention. Better performance was measured by the number of times the subjects detected the distractor stimulus. In their experiment, it was found that dominant eyes detected

more distractors than non-dominant eyes. The only test in my experiments comparable with Shneor and Hochstein's experiment was the second game, Disillusion. Disillusion primarily measures the subject's ability to switch tasks but also tests the subject's ability to search for targets. Similarly, Hochstein and Shneor's experiment focused on the relationship between ocular dominance and target searching specifically. It is likely that Disillusion was too complex a task to measure the effects of ocular dominance, as subjects were making decisions in addition to target searching.

Finally, in previous studies (Miles, 1929), right-eye dominance was exhibited to be more prevalent than left-eye dominance by a ratio of roughly 2:1, respectively. In my study, right-eye and left-eye dominance ratios were roughly 1:1; however, several of the left-eye dominant subjects claimed to have some sort of trauma to their right eye during childhood.

Physiological Mechanisms

My results, for one task, showed the dominant eye scored better than the non-dominant eye. Visual input stays separate through the lateral geniculate primary visual cortex. The ocular dominance column is evidence that two separate paths could receive preferential processing.

Preferential processing may correlate with cerebral lateralization. Many studies insinuated that this was a possible explanation of the outcomes. However, in my experiment, there was no evidence that cerebral lateralization can flip for left- and right-ocular dominant individuals because most games showed no significant difference between groups. One possibility is that dominance correlates to cerebral lateralization (Choi, Kim, Jeong, Lee, & Park, 2016). This is unlikely because the percentage of left-eye and right-eye dominance individuals was approximately the same.

Even though there is physiological evidence of ocular dominance columns, it did not appear to manifest itself in this visual processing experiment. It is possible that the brain compensates in visual processing experiments for eye dominance. This may be due to the interhemispheric connections of the corpus callosum. The corpus callosum may be responsible for this compensation in tasks between the different eyes. The semi-decussation, or partial crossing, of the optic chiasm may also play a role in the interhemispheric transfer of information to compensate for the monocular tasks.

Author's Note

William Alexander Holland ('17) graduated from the James Madison Honors College with a Bachelor of Science, Distinction in Biology, and a minor in Mathematics. He is pursuing a career in the biomedical sciences and is considering graduate studies focusing on neuroscience and use of mathematical modeling to predict/interpret data.

This paper revisits an Honors thesis of the same title. Mr. Holland would like to thank Dr. Corey L. Cleland (Biology), Dr. James S. Sochacki (Mathematics), and Dr. Roger Thelwell (Mathematics), whose help made his work possible.

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THE ROLES OF RACE AND GENDER IN CONTAGIOUS YAWNING

Daroon Jalil

ABSTRACT

Social psychologists often consider race to be a marker of in- or out-group status. When looking at race, implicit bias can take more subtle forms than outward racism. This study asked two research questions to better understand the psychology behind racial issues. The first question was whether the number of contagious yawns (CY) a person experiences depends on the race of the stimuli being viewed. Yawning more in response to in-group members is a phenomenon seen in chimpanzees, but it has not been studied in humans in a racial context. Black and white males and females were recruited to view videos of individuals from each race and gender category yawning while the experimenter documented the number of yawns incited by each video. The second question explored how levels of empathy affected the number of times participants contagiously yawned—a reflex that has been linked to empathy. A chi-square analysis revealed that participants yawned significantly more to racial in-group members than out-group members (^{2} (1) = 7.023; p = .008). The number of times a participant yawned was neither dependent on the gender of the yawners in each stimuli video nor dependent on the combination of race and gender. The correlation between empathy levels and the number of contagious yawns was not significant (r = .064, p = .491). The results suggest that other factors, independent of empathy, could have a greater effect on contagious yawning, and one particularly salient and powerful factor is race.

Empathy is the ability to put oneself in another's shoes and to experience events and emotions the way that person experiences them (Weiner & Auster, 2007). Researchers have proposed a simulation theory to explain how empathic responses occur (Barsalou, 1999; Gallagher & Meltzoff, 1996; Gallese, 2001; Gallese & Goldman, 1998). The theory holds that we experience empathy when we compare our previous experiences to another person's behaviors and thereby develop an understanding of their thoughts and emotions (Gallese, 2001). Through this process, emotional representation of the situation is formed, enabling a connection to develop (Gutsell & Inzlicht, 2010).

When people connect with others, they adopt their postures, intonations, facial expressions, motivational states, and emotions (Decety & Jackson, 2004; Gutsell & Inzlicht, 2010). The level of connection an individual has with someone also influences contagious yawning (CY) (Norscia & Palagi, 2011; Preston & de Waal, 2001). Empathy can be viewed on a spectrum where various complex social situations (Vignemont & Singer, 2006), like social category membership (Hornstein, 1978), can influence empathy levels.

Group Membership, Race, and Empathy

Social category membership can be based on different aspects of identity, but one particularly prominent social category is race. Preferences for racial in-group members have been found in infants, who respond more receptively to own-race strangers (Feinman, 1980; Kelly et al., 2005). In adults, educational and career choices have been shown to be influenced by own-race role models (Karunanayake & Nauta, 2004; King & Multon, 1996; Zirkel, 2002).

Differentiation of group membership can also be seen on a neurological level. Gutsell and Inzlicht (2010) measured more mirror neuron system activity when subjects watched in-group members compared to watching out-group members; the least amount of mirror neuron system activity was present in members identified as highly prejudiced. Neural systems involved in imitation, like the fronto-parietal system (Caspers, Zilles, Laird, & Eickhoff, 2010), have been shown to be influenced by the race of the person being imitated (Losin, Iacoboni, Martin, Cross, & Dapretto, 2012). When watching same-race members receive needle penetration, Xu, Zuo, Wang, and Han (2009) found neuroimaging evidence that brain areas related to first-person pain experience, like the anterior cingulate cortex and anterior insula (Botvinick et al., 2005; Hein, Silani, Preuschoff, Batson, & Singer, 2010; Jackson, Meltzoff, & Decety, 2005; Singer et al., 2004), can be influenced by racial-group membership. There is more activity in brain areas related to empathy, such as the anterior insula (Singer, 2006), compared to when they viewed racial out-group members in the same situation (Azevedo et al., 2012) when individuals view racial in-group members experiencing a negative event, like physical pain (Hein et al., 2010) or failure (Cikara & Fiske, 2011).. This in-group bias was seen in both white and black groups, but it was seen as stronger in white participants. Gutsell and Inzlicht (2010) found that people were less likely to mentally simulate simple actions, like drinking a cup of water, when a racial out-group member performed the action, and this effect was exacerbated when out-group members were disliked.

The difference in neural activity based on group membership, as Gutsell and Inzlicht (2010) explain, could be because we have a harder time recognizing out-group members' faces (Sporer, 2001) and interpreting their facial expressions (Elfenbein & Ambady, 2002); out-groups are also less likely to activate neural areas for social cognition (Harris & Fiske, 2006) and social perception (Van Bavel, Packer, & Cunningham, 2008). Likowski, Mühlberger, Seibt, Pauli, and Weyers (2008) also found that negative attitudes toward out-group members lead to less facial mimicry for the viewer. This lack of mimicry, recognition, empathy, and social cognition for out-group members, or increase of them toward in-group members, has the potential to amplify racial divides.

Contagious Yawning

Empathy has been linked to CY, a phenomenon where seeing, hearing, or even reading about yawning can trigger a yawn in the observer (Platek, Critton, Myers, & Gallup, 2003; Platek, Mohamed, & Gallup, 2005; Schürmann et al., 2005). CY has been shown to be a manifestation of rudimentary forms of empathy (Norscia & Palagi, 2011; Platek et al., 2003; Platek et al., 2005; Senju et al., 2007), self-awareness, and theory of mind (Platek et al., 2003). Neuroimaging evidence also supports the link between empathy and CY (Platek et al., 2005; Schürmann et al., 2005). Not everyone is susceptible to CY; around 40–60% of the population experience CY in controlled studies (Bartholomew & Cirulli, 2014), and some of that variation has been linked to varying levels of empathy (Cooper et al., 2011). Norscia and Palagi (2011) found that a person's susceptibility to CY was linked to the familiarity and type of connection with the person yawning: the most yawning occurred when viewing family members yawn, followed by viewing friends yawn and viewing acquaintances yawn. People were least likely to experience CY when viewing strangers yawn. This clear difference in the likelihood of yawn responses supports the notion that in-group bias can affect susceptibility to CY.

Schizotypal personality traits, specifically those characterized by a difficulty establishing social relationships, were found to be inversely related to susceptibility to CY (Platek et al.,

2003). Similarly, higher scores on psychopathy scales, which measure levels of psychopathic tendencies, such as being antisocial; manipulative; and apathetic, were associated with a lower likelihood of CY (Rundle, Vaughn, & Stanford, 2015). Autism-Spectrum Disorder (ASD), a disorder known for deficits in social skills, has been linked to impairments in CY (Senju et al., 2007). Cooper et al. (2011) found a negative correlation between scores on the Interpersonal Reactivity Index (IRI), which is used to measure empathy, and those on the Autism-Spectrum Quotient scale (Davis, 1980). Those who scored higher on empathy scales showed more empathy for both in- and out-group members (Xu et al., 2009).This demonstrates that there are individual differences in empathy, but that in-group bias can affect susceptibility to CY (Norscia & Palagi, 2011).

Chimpanzees, primates that show basic forms of empathy (O'Connell, 1995), are one of the few animal species susceptible to CY (Anderson, Myowa-Yamakoshi, & Matsuzawa, 2004). Campbell and de Waal (2011) found that chimpanzees experienced more yawns when watching in-group members yawn compared to watching both familiar chimpanzees at rest (the control) and watching out-group members yawn, demonstrating that an in-group bias for CY, and possibly for empathy, exists in chimpanzees.

Current Study

The objective of the current study was to measure CY to determine whether individuals are more empathetic toward others who are racially similar to themselves. Empathy can directly affect our behaviors and influence implicit bias, and when looking at race, bias can take forms more subtle than outward racism. These forms are important to understand to recognize the psychology behind racial issues. Lack of empathy for out-group members, or preferential empathy toward in-group members, has the potential to amplify racial divides, which has dehumanizing effects. One measure of empathy is CY, but susceptibility to CY has not been studied from a racial in-group and out-group perspective.

The current study measured whether individuals differentially yawned to in-group and out-group members to determine if individuals were more empathetic toward others who are racially similar to themselves. Participants completed the IRI, a scale used to assess multiple dimensions of empathy, and watched a series of clips of white and black individuals yawning. CY was measured by counting the participants' number of yawns while watching for yawning stimuli from in- and out-group members. The researcher expected empathy levels to predict CY and that individuals would yawn more when viewing members of their same race compared to the different race.

Methods

Participants

Participants were recruited through James Madison University's Department of Psychology Research Participant Pool, an online database of the different studies conducted in psychology research lab. All students enrolled in PSYC 101 or 160 are expected to earn three units of credit by participating in these research studies (or alternative activities), and these credits count toward their final course grade. In the study's description on Participant Pool, one of the requirements listed was that participants had to identify as either white or black. Since JMU's student population is predominantly white, the researchers also recruited students in the Centennial Scholarship Program (CSP), a university program that offers financial support to underrepresented minorities. Students recruited from CSP received community service hours, a requirement of the program, in return for their participation. The researcher also contacted students at the Center for Multicultural Student Services to recruit black participants. These students volunteered to participate and were not compensated for their participation. Because this was the first study looking at CY and race in a systematic way, participants who identified as any race other than white or black were ineligible. Participants who identified as mixed race were also ineligible. There were a total of 119 participants: 25 black male participants (BMP), 28 black female participants (BFP), 32 white female participants (WFP), and 32 white male participants (WMP). IRB approval for this study can be found under IRB number 17-0119.

Measures & Materials

QUESTIONNAIRE. Participants were first asked to fill out a two-part questionnaire. The first section asked how much sleep the participants received the past night and how long they had been awake. The second part of the questionnaire was the full IRI. The IRI is a 28-item, 5-point Likert scale administered to assess two different components of empathy: cognitive and affective. Cognitive empathy is comprised of *perspective taking,* the tendency to take on a different point of view, and *fantasy,* the tendency to translate oneself into the feelings of fictitious characters. Affective empathy is comprised of *empathic concern* and *personal distress,* which measure feelings of sympathy and concern for those less fortunate and feelings of personal anxiety in tense interpersonal settings (Bartholomew & Cirulli, 2014; Cooper et al., 2011; Davis, 1983; Davis, 1980). The IRI is composed of a series of statements and situations in which participants are asked to rate how well the prompt describes them. The scale ranged from 1–5, with 1 being "does not describe me well" and 5 being "describes me very well." Participants could obtain a score anywhere in the range

from 7–108 for overall empathy, with lower scores indicating lower levels of empathy and higher scores indicating higher levels of empathy.

YAWNING VIDEO STIMULI. Video clips of black and white males and females were downloaded from YouTube into Windows Media player and edited together into a final video sequence. The video clips were reordered to make four versions of the final video sequence, thus counterbalancing to ensure that yawns are the result of race or gender. These clips were taken from different angles, and the subjects shown were of varying ages. The final four versions were uploaded to YouTube again, this time on a private account, so only the researcher who had access to the YouTube account could access them.

The duration of the final yawning videos were each 6 min 53 s. The videos were broken up into four blocks: black male stimuli (BMS) (1 min 33 s), black female stimuli (BFS) (1 min 25 s), white male stimuli (WMS) (1 min 40 s), and white female stimuli (WFS) (1 min 48 s). There were a total of six yawners in each blocked section. Participants saw each yawning clip three times (i.e., BMS clip #1 was played three times in a row, then BMS clip #2 was played three times in a row until all six BMS clips were displayed to the participants). There was a 0.5 s transition between each yawning clip and a 1.5 s transition between stimuli blocks. During this 1.5 s transition, participants were presented with an image of a landscape.

YAWNING RATINGS. Participants were asked to rate how realistic the yawns in the video they watched were on a scale of 1–5, with 1 being "not realistic at all" and 5 being "very realistic." If a clip was consistently rated as unrealistic, it could potentially affect the total number of yawns elicited in response to that certain stimuli group. These ratings also ensured that participants were watching the videos.

Procedures

When participants first arrived, they were given a consent form and made aware of all their rights as participants. They were told that the purpose of the study was to rate yawning videos on how realistic the yawn was and that highly rated yawns would be used in future studies. Participants were provided a false purpose to ensure that any yawns were natural. After consent was given, participants were asked to complete the online survey that asked for demographic information in addition to the IRI questionnaire.

Participants then watched the yawning videos. While the participant was watching the video, the researcher remained in the far left corner of the room, out of the participant's field of vision. While the participant was watching the videos, the researcher counted and documented how many times the participant yawned. The placement ensured the researcher could discreetly count the participant's yawns without the participant noticing. A mirror was also hidden in the far right corner of the room in a stack of papers and miscellaneous objects. The mirror provided the researcher a front view of the participant's face visible if the side view was obstructed.. Most participants did not notice the mirror, and those who did see the mirror did not appear distracted by it.

The researcher recorded how many times the participants yawned while watching each set of stimuli (BMS, BFS, WMS, WFS). After participants finished watching each video, researchers debriefed them on the true nature of the study, answered questions, and offered the researcher's contact information if they had any further questions.

Results

Research Questions

DO INDIVIDUALS YAWN MORE TO AN IN-GROUP MEMBER YAWNING THAN THEY DO TO AN OUT-GROUP MEMBER? Three chi-square tests of independence were conducted: one across all groups, $^{2}(9) = 7.023$; $p = .171$, one across race, $^{2}(1) = 7.023$; $p = .008$, and one across gender, $^{2}(1) = 1.303$; $p = .254$. The only chi-square test that was significant was the one across race, with both black and white participants yawning significantly more than expected to racial in-group members and significantly less than expected to racial out-group members, where *expected* refers to the number of yawns that would be considered normal for each group if there was an influence from group membership. Figure 1 displays a bar graph comparing the number of expected yawns to the number of observed yawns across racial in- and out-groups.

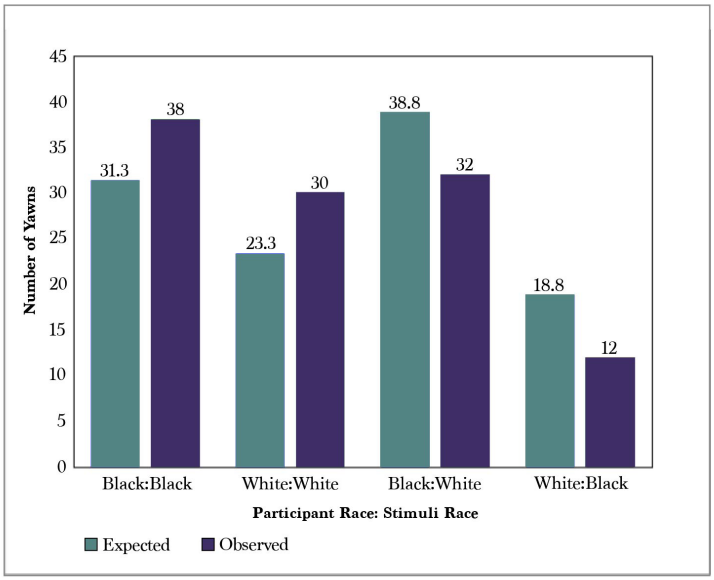

Figure 1. Observed & Expected : Comparisons Across Racial In-Groups and Out-Groups

Table 1
Correlation Coefficients Between Empathy Scores and the Number of Yawns

Measure	# of yawns to a race and gender match	# of yawns to a race and gender mismatch	# of yawns to a gender match	# of yawns to race match	Total # of yawns
Overall Empathy	.005	.052	.008	.066	.064
Fantasy	-.002	-.027	-.023	-.008	-.006
Empathic Concern	-.074	-.120	-.138	-.124	-.149
Perspective Taking	-.059	-.078	-.074	-.056	-.067
Personal Distress	-.039	.126	-.021	-.059	-.008

DO EMPATHY LEVELS PREDICT CY? A correlation revealed that overall empathy score did not predict the number of contagious yawns (r = .064, p = .491). In addition to an overall empathy score, the IRI breaks empathy into four categories: *perspective taking, fantasy, empathic concern,* and *personal distress.* Scores for all four types of empathy were obtained for each participant. A correlation between overall empathy scores and their subscales was run with the number of yawns participants experienced in response to stimuli that were both race and gender matches, stimuli that were both gender and race mismatches, only gender matches, and only race matches. Table 1 provides the obtained correlation coefficients; no significant results were found.

While empathy levels did not predict the number of contagious yawns a participant experienced, they did predict how realistic participants rated the yawning stimuli. Individuals with higher empathy scores found the yawning stimuli to be more realistic (r = .240, p = .011).

Descriptives

TIREDNESS/HOURS ASLEEP/HOURS AWAKE. There were no significant differences across groups in participants' self-reported tiredness levels, $F(3,115) = 1.95$, p = .125, ^{2} = .048, or number of waking hours that day, $F(3,115) = 1.589$, p = .196, ^{2} = .040. There was a significant difference among conditions when the amount of hours slept were compared to the previous night, $F(3,115) = 3.079$, p =.030, ^{2} = .074, with WFP sleeping about an hour more than BFP, $t(58) = 3.152$, p = .003. Hours slept the previous night was used as a covariate for analyses involving number of yawns.

EMPATHY SCORES. A comparison of empathy scores across groups revealed that there was a significant difference in mean empathy scores, $F(3,118) = 5.279$, p = .002, ^{2} = .121. Tukey's post hoc analysis revealed that WMP averaged 8.65 points fewer on the empathy scale than WFP, $t(64) = 3.258$, p = .002, and 8.04 points fewer than BFP, $t(60) = 2.787$, p = .007. Table 2 provides mean empathy scores and standard deviations. When comparing empathy across only gender, female participants (FP) had a significantly higher level of empathy score than male participants (MP), $t(117) = 3.940$, p < .000. There were no significant differences in empathy scores across race, $t(117) = .460$, p = .646.

NUMBER OF YAWNS EXPERIENCED BY PARTICIPANTS. There was a significant difference in the number of yawns experienced by participants across conditions, $F(3,115) = 3.273$, p = .024,^{2} = 0.079, with Tukey's post hoc analysis indicating that BMP yawned more than WFP, $t(25) = 2.63$, p = .014. Comparisons across only gender indicated that MP yawned more than FP, $t(95) = 2.041$; p = .044. Comparisons across race revealed that black participants (BP) yawned more than white participants (WP), though this difference was not significant, $t(91) = 1.863$, p = .066. There was no significant difference in the number of yawns each stimuli block received when taking race and gender into consideration, $F(3,12) = .161$, p = .920, ^{2} = .039.

Table 2
Mean Empathy Scores

Race	Male	Female	Total
White	62.4 (11.7) * •	71.0 (8.72) •	66.7 (10.21)
Black	64.2 (9.64)	70.4 (10.7) *	67.3 (10.17)
Total	63.3 (10.7) °	70.7 (9.71) °	

• indicates significant differences (p < .05) between groups
* indicates significant differences (p < .05) between groups
° indicates significant differences (p < .05) between genders

RATINGS. A comparison of the mean realistic score each group of stimuli received revealed a significant overall difference, $F(3, 417) = 15.576$, p = .000, ^{2} = .101. Post hoc analysis indicated that BM received higher ratings than BF, $t(196) = -5.743$, p < .000) WF, $t(201) = -6.62$, p < .000, and WM, $t(201) = -5.00$, p < .000, but no other differences between ratings score existed between the other groups.

Discussion

Two research questions were asked in this study to better understand the psychology behind racial issues. The first question asked if empathy levels can predict contagious yawning. The second asked if the number of contagious yawns a person experiences depends on the race of the stimuli that the participant views in each video clip. The researcher expected there to be a relationship between empathy levels and CY, and that participants would yawn more to the stimuli of racial in-group members than out-group members.

The study found that participants yawned significantly more to racial in-group members and less to out-group members across both races; that is, the number of yawns a participant experienced was dependent on the race of the yawner in the stimuli clip. Black participants yawned significantly more than expected to black stimuli clips, and white participants yawned more than expected to white stimuli clips. The number of yawns was not dependent on whether the gender of the yawner in the stimuli clip was an in- or out-group member, nor was it dependent on the combination of race and gender.

Contrary to the research hypothesis and previous findings (Norscia & Palagi, 2011; Platek et al., 2003; Rundle et al., 2015), this study found no link between the obtained empathy scores and CY. Our tool to measure empathy levels, the IRI, is a commonly used scale (Azevedo et al., 2012) that measures self-reported empathic tendencies (Corte et al., 2007). Bartholomew and Cirulli (2014), who also had participants fill out the IRI and watch yawning videos, found no link between empathy and CY. When comparing empathy scores, it was found that females had significantly higher levels of overall empathy than males, replicating previous findings (Christov-Moore et al., 2014; Cohn, 1991; O'Brien, Konrath, Gruhn, & Hagen, 2012). However, males yawned significantly more than females in our study. Table 3 provides a comparison of the number of participants in each group, the number of participants who yawned, and the total number of yawns experienced per group. If empathy scores and number of yawns were related, it would follow that there should be a greater proportion of female yawners or a higher number of yawns by females, but that was not found.

Although empathy score was not significantly correlated with number of yawns, empathy score was significantly correlated with the ratings participants gave the yawning stimuli. Conscious actions, like answering the questions on the IRI and rating a person's action (a yawn in this situation) require intentional thought and a certain level of self-awareness. Contagious yawning, on the other hand, is a much more unconscious behavior. The actions that require conscious effort were more related to one another than one that is unconscious. Participants may consciously report, and believe, that they respond to all stimuli the same. Their higher levels of empathy led them to answer questions and rate stimuli a certain way. However, unconsciously, they still were yawning more to racial in-group members than out-group members, indicating that they were still subject to racial in- and out-group bias. Despite empathy levels, people unconsciously paid better attention to or picked up on more cues from racial in-group members than out-group members. These findings suggest that while empathy could be related to CY, there are other factors that are more impactful on CY. The results suggest that race is more influential on CY than empathy.

Table 3
A Comparison of Total Participants per Group, Number of Yawners, and Number of Yawns

Group	Number of participants	Number of yawners	Number of yawns
BFP	28	12	33
BMP	25	13	37
WFP	32	3	4
WMP	34	13	40

Implications

Unintentionally paying more attention to and taking cues from racial in-group members has subtle but powerful implications when applied to institutions in the U.S. According to the *Washington Post*, the 114th Congress of the United States is composed of 79.8% white representatives, while the Senate is composed of 94% white senators (Bump, 2015). From a policymaking perspective, lawmakers may be more inclined to listen to in-group member constituents. This becomes an issue when the vast majority of lawmakers are members of a fairly homogenous population, white, but the constituents that they are supposed to represent are far more diverse. A possible mitigation of this issue is to increase the representation of minorities in Congress. Whitby and Krause (2001) found that black members of congress are more supportive of black policies than their white counterparts. Furthermore, after controlling for social characteristics like age, gender, education, and years the representative spent in their community, Tate (2001) found that black constituents reported being significantly more satisfied with their representative when the representative was black .

There is also an imbalance of racial variety in the leadership of our country's classrooms and learning spaces. According

the U.S. Department of Education (2016), 82% of the teachers in public schools are white. In education, primarily in elementary education, teachers may unintentionally pick up on more subtle cues from students of the same race. Rosenthal and Jacobson (1968) found that teacher expectations affect their interaction with their students, which in turn affected the students' success in school. Stereotypes of out-group members' academic abilities could affect teacher expectations, which in turn can affect out-group members' academic performance. Increasing teacher diversity could help mitigate some issues seen in the school system. Pitts (2005) found that teacher diversity had a positive impact on dropout rate and SAT performance but a negative impact on Texas Assessment of Academic Skills pass rates, noting that diversity is a complex issue that has various effects on different performance measures.

Racial in-group preference also has implications in our healthcare system. According to the Association of American Medical Colleges (2014), about 49% of the physicians in the U.S. are white. Distrust of physicians by black communities has been well documented (Armstrong, Ravenell, Mcmurphy, & Putt, 2007; Jacobs, Rolle, Ferrans, Whitaker & Warnecke, 2006; Suite, La Bril, Primm, & Harrison-Ross, 2007). These subtle racial biases can play a role in the reported lack of interpersonal skills (Jacobs et al., 2006) that leads to this mistrust the black community has for healthcare providers.

The government, education system, and health care system are all systems that affect an individual's access to resources and opportunities. When the majority of the people with power in these systems (lawmakers, teachers, doctors), are of the same race, it has the potential to affect subtle forms of institutional racism, despite being well intended, or having high levels of empathy.

Limitations and Areas for Future Studies

One limitation with the study is that there were a number of participants who would stretch, sigh heavily, and display other signs that are associated with yawning without overtly yawning. There were also participants who, once debriefed, said they held back their yawns or tried to not yawn. Future studies should systematically find a way to account for these heavy sighs and stretches. Some of the stimuli had the yawner in the video stretching along with the yawn, so the heavy sighs or yawns could be interpreted as imitative behaviors. Researchers should also incorporate asking participants how tired they felt while watching the videos and if they held back the urge to yawn. While there were participants who reported suppressing the urge to yawn during this study, this was information volunteered from the participant. Since there was deception used in the study, researchers could not explicitly tell the participants to refrain from suppressing their yawns. Future studies should find a way to tell participants to feel free to yawn without making it obvious. The researchers tried to bring this up conversationally when explaining the task to participants by saying things like "don't feel bad if you yawn" when participants brought up to the researcher that they would probably yawn. Doing this systematically as a part of the protocol would reduce the number of participants who were coded as non-yawners even though they could have been yawners. This could also affect the lack of relationship seen between empathy score and contagious yawning.

In the future, researchers should also collect information from the participants about the number of contact and interactions they have with people of a different race. The amount of contact someone has with members of an out-group could influence how they view out-group members (Pettigrew & Tropp, 2006). They could also use a questionnaire that measures the level of in- and out-group bias someone has. Age of the participant has been shown to affect CY (Bartholomew & Cirulli, 2014), and future studies should explicitly collect this information to run as a covariate. Future studies should continue to have gendered conditions to see if WF still yawn at a significantly lower rate. Video recordings of the sessions should also be considered, as it could reduce any errors caused by the researcher missing a yawn that occurred.

Finally, incorporating another factor into the study, the mirror neuron system may shed light on some gray areas about empathy and CY. Mirror neuron system activity has been associated with aspects of empathy like perspective-taking abilities (Gazzola, Aziz-Zadeh, & Keysers, 2006) and empathic concern (Kaplan & Iacoboni, 2006). Frontal human mirror neuron system activation has been correlated with both empathic behavior and imitating interpersonal skills (Pfeifer, Iacoboni, Mazziotta, & Dapretto, 2008). Mirror neuron system has also been linked to CY (Campbell & de Waal, 2011; Haker, Kawohl, Herwig, & Rössler, 2012). Given the mirror neuron system is linked to both empathy and CY, measuring this system's activity with an EEG machine could provide supplemental information to current findings.

Author's Note

Daroon Jalil ('17) graduated Summa Cum Laude with a bachelor's degree in Psychology. She is now in the Industrial Organizational Psychology graduate program at Old Dominion University. She hopes to work with non-profit companies and NGOs on implementing best practices to increase employee well-being and engagement.

Ms. Jalil thanks her parents, Sabriya and Mohammed Jalil, for demanding nothing but her absolute best in all her endeavors and for keeping her grounded in her values. Next, she thanks JMU's Centennial Scholars Program and Executive Director Dianne Strawbridge, who saw her potential and made her JMU education possible. Finally, Ms. Jalil thanks Dr. Melanie Shoup-Knox, who played a special role as her advisor throughout her undergraduate career, and her thesis committee members, Dr. Jeff Dyche and Dr. Krisztina Jakobsen, for their support and guidance.

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USING RESIDENTIAL LOCATION TO ASSESS THE ENVIRONMENTAL VALUE-ACTION GAP OF STUDENTS AT JAMES MADISON UNIVERSITY

Emma Martin

ABSTRACT

This study focuses on the environmental value-action gap of students at James Madison University (JMU) in Harrisonburg, Virginia. An environmental value-action gap occurs when a person has pro-environmental beliefs but does not have congruent actions. Over 1,000 JMU students completed a survey of their residence location, environmental values, and environmental actions. Students' preservation and utilization values were assessed using a 2-Dimensional Model of Ecological Values (2-MEV), and their frequency of environmental actions was assessed through a series of Likert-scaled statements. It was hypothesized that any value-action gap would be wider in students who resided in off-campus housing compared to students who resided in on-campus housing, due to on-campus students' proximity to the university's numerous green initiatives. Instead, the data showed that off-campus students had higher mean value and action scores than on-campus students, although a value-action gap did exist in both populations. Additionally, there was a moderate correlation between the values and actions within both groups, indicating that stronger values might lead to more frequent actions. The results of this study can help enhance green initiatives at JMU and other universities.

James Madison University (JMU) is a public university located in Harrisonburg, Virginia, with nearly 20,500 students. The university projects increased enrollment (Office of Institutional Research, 2017) and intends to continue to support academic programs related to STEM and environmental sustainability (James Madison University, 2017). As the number of students living in Harrisonburg increases, the university will face greater pressure to maintain and improve its sustainable practices. The JMU Environmental Stewardship Action Plan outlines an array of university-wide sustainability practices. Several are already in place: accessible alternative transportation, Leadership in Energy and Environmental Design gold and silver certified buildings, partnerships with local farms to supply food to dining halls, and waste composting (James Madison University, n.d.; The Office of Environmental Stewardship, 2016). However, despite the university's work to encourage sustainability and positive environmental action, even students strongly in favor of protecting the environment and conserving resources may not always follow through on their values. This possible value-action gap occurs because other factors influence students' environmentally-supportive behavior (Howell, 2013).

The purpose of this study is to determine if location is a factor that affects students' actions regarding the environment and then to assess whether a value-action gap exists at JMU. Location has the potential to motivate pro-environmental behavior because proximity to green initiatives is assumed to produce a higher frequency of pro-environmental action. Pro-environmental action is defined as any behavior that protects or encourages the protection of the environment and its resources (Liefländer & Bogner, 2014; Malandrakis, Boyes, & Stanisstreet, 2011). Understanding the diffusion of environmental behavior from on-campus living to off-campus living is important because the majority of a JMU student's residency is often off-campus. It is hypothesized that on-campus students participate in pro-environmental actions more frequently than off-campus students because on-campus students live and study amid campus-wide sustainability initiatives, and that they therefore have a smaller value-action gap.

Literature Review

Environmental Attitudes

Studies have been conducted to better understand the factors that affect students' attitudes toward the environment (Boyes & Stanisstreet, 2012; Hebel, Montpied, & Fontanieu, 2014; Liefländer & Bogner, 2014; Malandrakis et al., 2011; Wiseman & Bogner, 2003). Hebel, Montpied, and Fontanieu (2014) studied the link between students' environmental attitudes and their interest in learning about environmental topics, environmental extracurricular activities, and value priorities for their future careers. They determined that students who are interested in learning about the environment as well as students who are involved in nature-related extracurricular activities show higher levels of concern for the environment. On the other hand, students whose career goals involve "earning lots of money," "controlling other people," or "becoming famous" tend to have more apathetic views toward the environment. Other studies have shown that efficacy plays a major role in whether or not a person participates in environmental actions. Students who feel their behavior actually impacts the environment in a positive manner are more likely to continue this behavior (Boyes & Stanisstreet, 2012; Malandrakis et al., 2011).

Attitude research often uses a 2-Dimensional Model of Ecological Values (2-MEV) questionnaire to keep results comparable between studies (Liefländer & Bogner, 2014). A 2-MEV questionnaire, first proposed by Wiseman and Bogner (2003), assesses respondents' ecological values on two orthogonal dimensions: the biocentric dimension (Preservation) and the anthropocentric dimension (Utilization). A biocentric view holds that it is important to take care of the environment whereas an anthropocentric view holds that it is acceptable for humans to utilize the environment to their advantage. The orthogonal aspect of this model is important because it states that preservation and utilization are mutually exclusive and not correlated. A high preservation (PRE+) score and a low utilization (UT-) score means that the person cares about the environment and believes in conservation. PRE- UT+ means that the person uses the environment for personal gain and does not care much about conservation. In contrast, PRE- UT- is associated with someone who is generally uninterested in environmentalism, and PRE+ UT+ reflects someone who is spontaneously dissonant and easily able to switch positions (Wiseman & Bogner, 2003).

Age

Few studies concentrate on students in higher education, as survey respondents in the literature range from 9–15 years old. Liefländer and Bogner (2014) found that younger students are considered more impressionable and therefore more easily influenced to care about the environment. In contrast, Hebel et al. (2014) found that older students in the 9–15 age range have a greater understanding of the context associated with environmental issues. The current study focuses on college students, as this population is positioned to immediately promote and practice environmental conservation and sustainability after graduation.

Location

Much of the research on the link between location and the value-action gap is on a global scale (e.g., the annual Greendex survey conducted by the National Geographic Society and GlobeScan). This scope makes it difficult to act on results at a local level, such as college campuses. A study of the environmental knowledge, attitudes, and behaviors of Chinese university students more closely relates to the purposes of the present study in its sample population and spatial component (Tiefenbacher, He, Hong, & Liu, 2011). The research provides some insight into the relationship between developed versus less-developed hometowns and environmental awareness. Results showed low overall environmental knowledge but did identify pro-environmental attitudes and a propensity for eco-friendly behavior. Students from developed regions showed slightly greater environmental knowledge and more positive environmental attitudes than those from less-developed regions, despite their similar educations.

The distinction between urban and less urban students in Tiefenbacher, He, Hong, and Liu (2011) can serve as a starting point for analyzing any value-action gap among JMU students. Off-campus living locations vary in their development, with the JMU campus in many ways the most developed area. If JMU is considered an urban center, then the hypothesis that on-campus students participate in more green initiatives due to their proximity to these initiatives aligns with the results of the Tiefenbacher et al. study. Nonetheless, the need for more research into the relationship between location and the potential value-action gap at JMU is apparent.

Existing literature has mostly sought to understand what factors influence values and then to determine if these values lead to more frequent actions. In contrast, the present study study seeks to understand how a single factor—location—influences values and actions almost as two distinct concerns. Rather than seeing if location influences beliefs, which then influences actions, this study attempts to determine if there are differences in students' values in each zone and in students' actions in each zone, and ultimately to determine if and where there is a value-action gap.

Methods

To determine whether environmental beliefs and behaviors vary among students living on campus and off campus, an IRB-approved (16-0239) Qualtrics survey was administered. This approach preserved respondents' anonymity and prevented responses from being associated with individual respondents. The survey was sent through the JMU bulk email system to all 20,297 students enrolled in the university. Students under the age of 18 were not permitted to participate. Prospective participants were informed in the initial bulk email and in the research consent form that 50 people who completed the survey would be randomly selected to receive cookies from Campus Cookies, a well-known local bakery. A total of 1,004 students—a response rate of 4.9%—completed the survey's three sections.

Demographics

The survey's first section asked about participants' gender, age, year in college, major, and where they lived in Harrisonburg. To collect spatial data without asking for identifiable information, an interactive ArcGIS online map was embedded in the survey. The map followed major roads in dividing Harrisonburg into seven zones with an additional eighth zone for residents living outside of Harrisonburg (Figure 1). Participants were directed to search for their Harrisonburg address to determine in which zone they lived. Participants living outside of Harrisonburg could select the closest town from a given list.

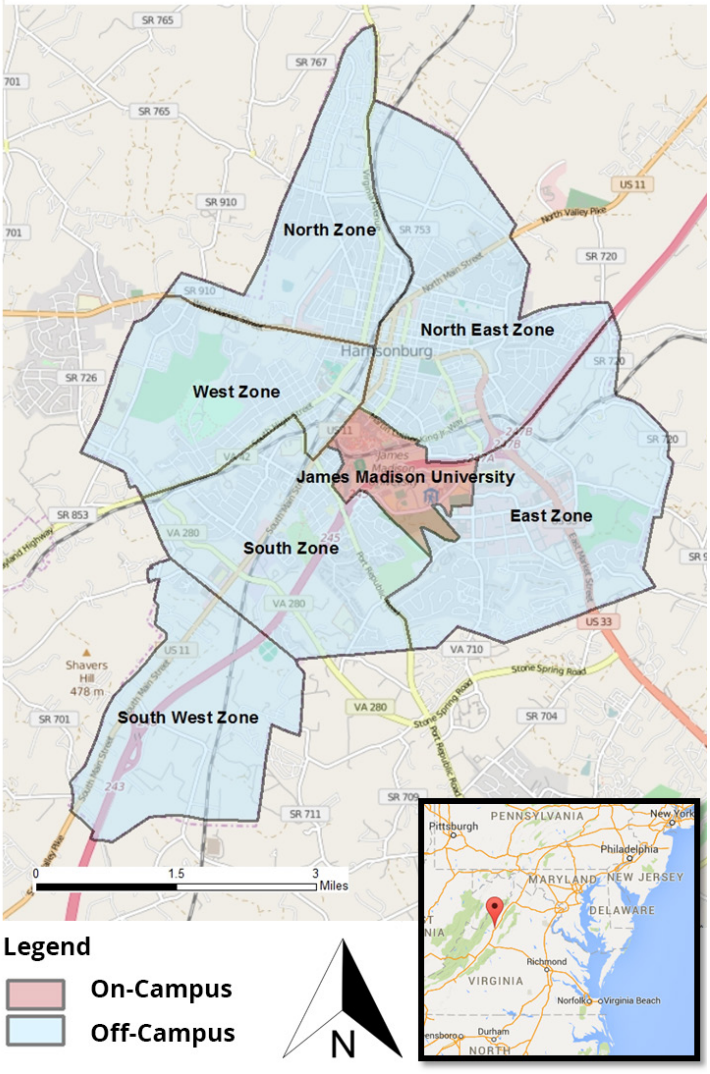

Figure 1. Map showing the eight on- and off-campus zones in and around Harrisonburg, Virginia. The non-Harrisonburg zone is not labeled.

Values

The second section of the survey assessed participants' environmental beliefs using Likert-scaled statements. This part of the survey design was based on the methodologies of Hebel et al. (2014) and Boyes and Stanisstreet (2012) and utilized a 2-Dimensional Model of Ecological Values (2-MEV) questionnaire. The purpose of using this methodology was to make the results of the present study comparable to the results of other studies that have used a 2-MEV test. Additionally, a 2-MEV analysis that identified whether JMU students view the world in biocentric or anthropocentric terms could allow for more targeted on- or off-campus environmental initiatives.

The 2-MEV section consisted of eight preservation statements and six utilization statements (Table 1). Statements in this section were developed from comparable surveys (Boyes & Stanisstreet, 2012; Hebel et al., 2014; Malandrakis et al., 2011) and pertained to environmental values about which the average JMU student could have an opinion. Participants were prompted to indicate how strongly they agreed or disagreed with each environmental belief on a 5-point Likert scale ranging from *Agree* to *Disagree* with a *No Opinion* option. Preservation statements were designed such that *Agree* indicated the strongest pro-environmental belief whereas utilization statements were designed such that *Disagree* designated the strongest pro-environmental belief. To account for this difference, Likert scale responses for the preservation statements were assigned different numbers (*Disagree* = 1, *Slightly Disagree* = 2, *No Opinion* = 3, *Slightly Agree* = 4, *Agree* = 5) than the utilization statements (*Agree* = 1, *Slightly Agree* = 2, *No Opinion* = 3, *Slightly Disagree* = 4, *Disagree* = 5). Reversing the numbering scale made it easier to aggregate scores for each section as a whole, and to perform ANOVA and Pearson's correlation tests for the values and actions data. Utilization scores were not reversed for the 2-MEV analysis to keep the results consistent with comparable studies. The preservation and utilization subcategories identified in italics in the Table 1 Value Statements column were not disclosed to participants.

Actions

The survey's final section evaluated students' environmental behaviors. Fourteen statements related to environmental actions were chosen such that each action statement corresponded to a similar statement in the values section, similar to the methodology of Boyes and Stanisstreet (2012). For example, the action statement "Investigate new ways to protect the environment" paired with the value statement "It is important to learn about new ways to protect the environment" (Table 1). The idea was to determine whether participants' values correlated with their ongoing actions and thus whether a value-action gap existed. Action statements were divided into seven subcategories of typically surveyed environmental behaviors: recycling, recreation, transportation, energy consumption, participation in green events, water consumption, and responsible consumerism (Boyes & Stanisstreet, 2012; Hebel et al., 2014; Malandrakis et al., 2011; Stone, 2014). Participants were directed to indicate how often they performed each action using a 4-point Likert scale—*Never* = 1, *Occasionally* = 2, *Often* = 3, *Always* = 4. The seven environmental behavior subcategories identified in italics in the Table 1 Action Statements column were not disclosed to participants.

Results

Demographics

Nearly 41% of students who participated in the survey lived on campus while 59% lived off campus. South zone and East zone had the greatest number of off-campus respondents at 208 and 200 respectively. The average participant age was 20.25 years old. On-campus respondents had the lowest mean age, 19.02, which makes sense as over 90% of 2015-2016 freshmen lived on campus and nearly 90% of 2015-2016 non-freshmen lived off campus (Office of Institutional Research, n.d.). Participants in the non-Harrisonburg zone had the highest mean age at 25.15, which again makes sense as older students are more likely to be returning to school and commuting from outside of Harrisonburg. On-campus students had the lowest average number of years completed at JMU at 1.54, while students in off-campus zones averaged between 3.0 and 3.28. Across all zones, there was a relatively even spread of responses from each academic level: Freshman (28%), Sophomore (22%), Junior (22%), and Senior (28%).

Values

ALL ZONES. The overall values score for all survey participants is 4.22 out of a possible 5, which indicates that respondents as a whole had strong pro-environmental beliefs. The mean preservation score for the sample population as a whole is 4.51, indicating a strong biocentric view and an affinity for environmental protection. The mean utilization score is 2.06 out of 5, indicating a non-anthropocentric view with some feelings against consumption of environmental resources.

Figure 2 shows that utilization scores are less polarized than preservation scores. Figure 2 also shows the overall strong affinity of JMU students for pro-environmental beliefs. At least 80% of participants reported that they *Slightly Agree* or *Agree* with the eight preservation statements, or *Slightly Disagree* or *Disagree* with three of the six utilization statements. "It is a good thing to turn off the lights when they are not needed" (Statement 4) produced the strongest response with 98% of students choosing *Slightly Agree* or *Agree*. "There is no need to reduce, reuse or recycle because humans are meant to use nature for their own benefit" (Statement 12) garnered the second strongest response with 96.6% of students choosing *Slightly Disagree* or *Disagree*.

Table 1

Value and Action Statement Pairs Used in the Qualtrics Survey Distributed to JMU Students.

Statement Number	Value Statements	Action Statements
1	It is important to learn about new ways to protect the environment. *preservation*	Investigate new ways to protect the environment. *participation in green events*
2	I would volunteer to help clean up the environment. *preservation*	Participate in "green" events, such as Blacks Run CleanUp Day. *participation in green events*
3	It is a good thing to try to help others understand that nature is important. *preservation*	Help others understand the impact their actions have on the environment (i.e., encouraging friends to recycle). *participation in green events*
4	It is a good thing to turn off the lights when they are not needed. *preservation*	Turn the lights off when they are not needed. *energy consumption*
5	Taking the bus, walking or riding a bike decreases a person's energy consumption. *preservation*	Walk or bike rather than taking the bus. *transportation*
6	It helps the environment to eat locally grown food. *preservation*	Eat locally grown food. *responsible consumerism*
7	It is important to go outside and enjoy nature as much as possible. *preservation*	Spend time outside for fun. *recreation*
8	Listening to the sounds of nature is an enjoyable experience. *preservation*	Notice the sounds of nature. *recreation*
9	There is no need to conserve water because there is so much water. *utilization*	Turn off the water when brushing your teeth. *water consumption*
10	Recycling does not do enough good to make up for the harm we cause the environment. *utilization*	Buy recycled products. *responsible consumerism*
11	If I throw away plastic bottles, it will not make a big difference because I am only one person. *utilization*	Separate recyclables from garbage. *recycle*
12	There is no need to reduce, reuse or recycle because humans are meant to use nature for their own benefit. *utilization*	Drink from a reusable water bottle. *water consumption*
13	I use air conditioning whenever possible. *utilization*	Open the windows rather than turn on the air conditioning. *energy consumption*
14	Understanding which items should be put in compost, recycling and landfill bins takes too much time. *utilization*	Sort trash into proper receptacle (i.e., compost, landfill, etc.). *recycle*

(*Note:* Respondents did not see the italicized value and action subcategory identified below each statement.)

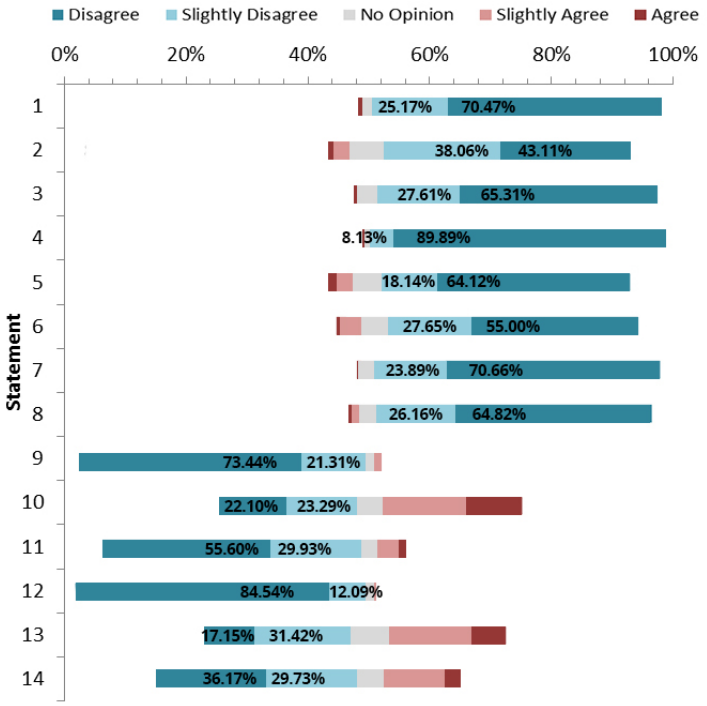

Figure 2. Distribution of scores for all survey responses to the 14 value statements.

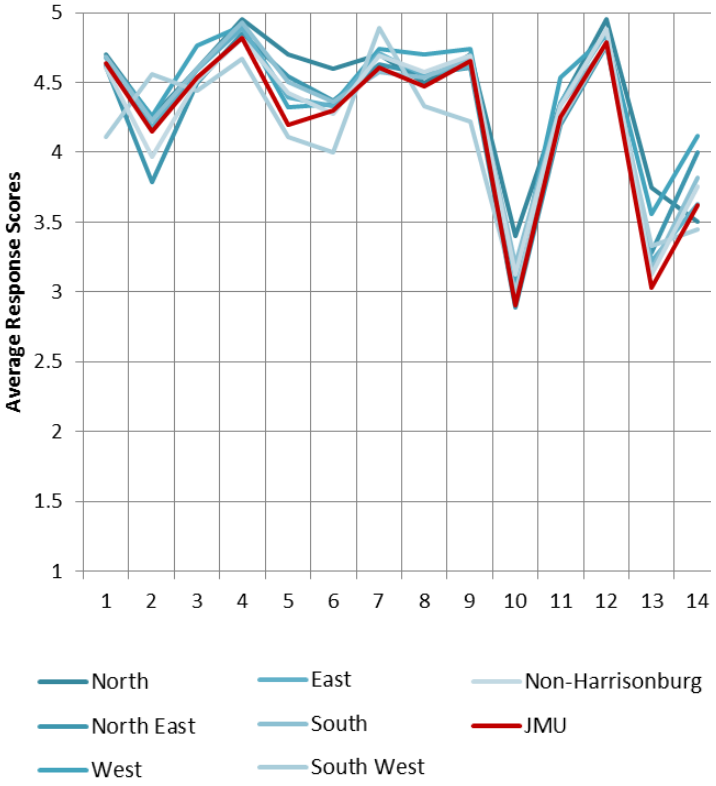

Figure 3. Average responses for the 14 value statements in the eight on- and off-campus zones.

Three statements produced less definitive responses. Only 51.4% of students reported that they *Slightly Agree* or *Agree* with Statement 13: "I use air conditioning whenever possible." Similarly, 54.7% of students reported that they *Slightly Disagree* or *Disagree* that "Recycling does not do enough good to make up for the harm we cause the environment" (Statement 10). The only other statement that did not indicate strong beliefs was "Understanding which items should be put in compost, recycling and landfill bins takes too much time" (Statement 14). That respondents split nearly evenly in their responses to these three statements indicates clear divisions in the JMU community.

ON-CAMPUS ZONE V. COMBINED OFF-CAMPUS ZONES. Off-campus students reported stronger pro-environmental beliefs than on-campus students. An Analysis of Variance (ANOVA) test shows the difference between the combined off-campus value scores (4.3) and the on-campus value scores (4.21) to be statistically significant ($p \leq 0.05$). The ANOVA also identifies significant differences in responses to Statements 5, 10, 13, and 14. The difference in mean response scores for all other value statements is less than 0.09, but the difference for these four statistically significant outliers ranges from 0.16 to 0.58, which shows that on-and off-campus students are more divided on these values.

ON-CAMPUS ZONE V. INDIVIDUAL OFF-CAMPUS ZONES. Figure 3 shows the mean responses for the 14 value statements in each of the eight on- and off-campus zones. The mean responses from the off-campus zones follow a similar trend with minimal deviations from the on-campus zone responses highlighted in red. The ANOVA test for each statement is inaccurate at determining statistically significant variation between the on-campus zone and the individual off-campus zones. For example, Statement 5—"Taking the bus, walking, or riding decreases a person's energy consumption"—is one of two statements that show significant variance, as the South zone mean (4.5) is 0.3 higher than the on-campus zone mean (4.2). However, there are even greater variations that the ANOVA does not specify. For example, the North zone has a mean of 4.7 for this statement, a difference of 0.5. The smaller sample size for the North zone (N = 22) in comparison to the South zone (N = 208) may have altered the ANOVA test results. These uneven sample sizes mean that the analysis cannot be deemed conclusive.

2-MEV ANALYSIS. The on-campus zone has a mean PRE score of 4.47 and a mean UT score of 2.13, while the off-campus zones are at 4.53 and 2.00. Because the UT Likert scale was not inverted for the 2-MEV analysis, lower UT scores indicate a more environmentally protective response. The 2-MEV ANOVA comparing PRE and UT value scores for the on-campus zone and the combined off-campus zones indicates that the means are statistically different and better in both cases for the off-campus zones as a whole.

Figure 4 shows the 2-MEV comparison of the on-campus zone and each of the seven off-campus zones. The greatest difference in average PRE score is between the on-campus

zone (4.47) and the North zone (4.63), which reported stronger biocentric and protective environmental values than any other zone. The lowest PRE score, and therefore the least concerned with preservation, is for the Southwest zone (4.39). For UT, the greatest difference is between the on-campus zone (2.13) and the West zone (1.86). The West zone reported the lowest, and therefore least anthropocentric, utilization beliefs. The highest, or least pro-environmental, UT score is for the Southwest zone. The North zone has the greatest gap between the two scores (PRE = 4.63, UT = 1.89). In other words, the North zone reported the strongest combination of biocentric values and non-anthropocentric values.

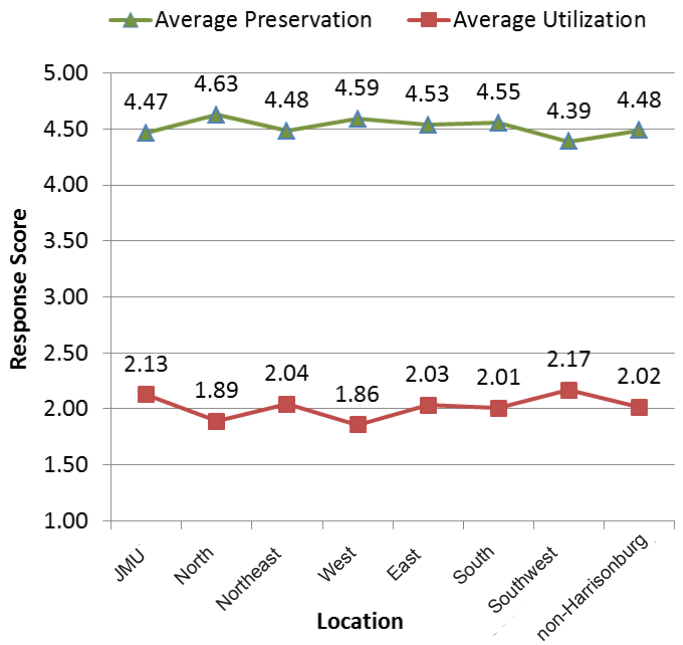

Figure 4. 2-MEV comparison of average preservation and average utilization scores for respondents in all eight on- and off-campus zones.

More than 80% of all respondents chose *Often* or *Always* for three action statements. The action that students reporting performing the most was "Turn the lights off when they are not needed" (Statement 4) with 94.5% of students responding *Often* or *Always*. "Drink from a reusable water bottle" (Statement 12) and "Turn off the water when brushing your teeth" (Statement 9) also garnered strong responses, with 84.4% and 83.1% of students responding *Often* or *Always*, respectively.

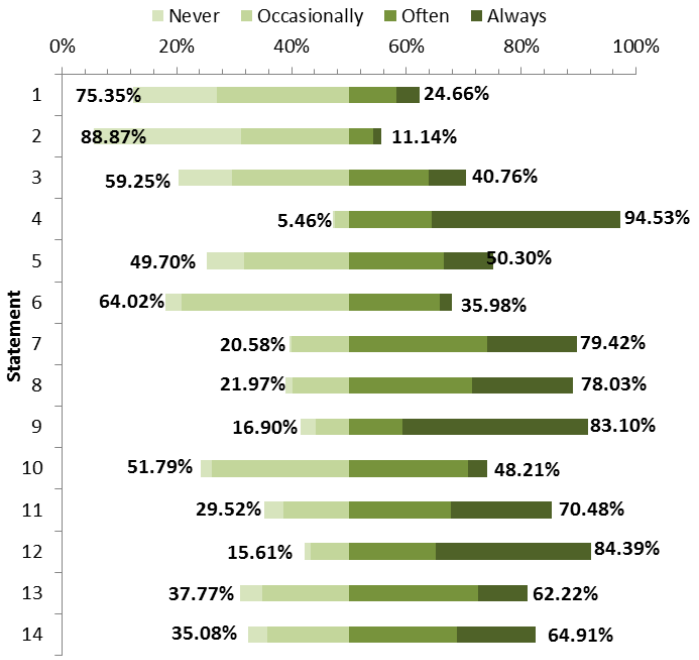

Figure 5. Distribution of scores for all survey responses to the 14 action statements. The numbers on the left indicate the percent of respondents who selected *Never* or *Occasionally*, while the numbers on the left indicate the percent of respondents who selected *Often* or *Always*.

Actions

ALL ZONES. The mean actions score for all survey participants is 2.76 out of 4, which means that respondents as a whole reported engaging in pro-environmental behavior more than *Occasionally* (2) and slightly less than *Often* (3). As shown in Figure 5, less than 50% of participants responded *Often* or *Always* for five of the 14 action statements. Statement 2 had the lowest frequency of action with 11.1% of students indicating they *Often* or *Always* "Participate in green events, such as BlacksRun CleanUp Day." Only 24.7% of students indicated they *Often* or *Always* "Investigate new ways to protect the environment" (Statement 1). "Eat locally grown food" (Statement 6), "Help others understand the impact their actions have on the environment (i.e., encouraging friends to recycle)" (Statement 3), and "Buy recycled products" (Statement 10) also had less than half of students responding *Often* or *Always*, with 36%, 40.8%, and 48.2%, respectively.

ON-CAMPUS ZONE V. COMBINED OFF-CAMPUS ZONES. The overall Actions Section mean for all off-campus respondents is 2.90, while the Actions Section mean for on-campus respondents is 2.64. In other words, in addition to reporting stronger pro-environmental values, off-campus students reported that they perform pro-environmental actions more frequently than on-campus students. The ANOVA test between on-campus responses and combined off-campus responses for the actions section indicates a statistically significant difference. The ANOVA also identifies significant differences for Statements 4, 12, 5, and 14. Off-campus students reported that they "Turn the lights off when they are not needed" (Statement 4) and "Drink from a reusable water bottle" (Statement 12) more often than on-campus students. However, on-campus students reported that they "Walk or bike rather than taking the bus" (Statement 5) and "Sort trash into proper receptacle (i.e., compost, landfill, etc.)" (Statement 14) more than off-campus students.

ON-CAMPUS ZONE V. INDIVIDUAL OFF-CAMPUS ZONES. Figure 6 shows the mean responses for the 14 action statements in the eight on- and off-campus zones. As in Figure 3, the mean responses from the off-campus zones follow a similar trend with minimal deviations from the on-campus zone responses highlighted in red. The ANOVA test shows variance in the data for Statements 4, 5, and 14, which is consistent with the Actions Section: Combined Zones results except for Statement 12. Tukey's comparison test indicates that for the statement "Turn the lights off when they are not needed" (Statement 4), the East zone and the South zone have higher means than the on-campus zone. The higher scores on this statement for the two off-campus zones are consistent with the combined off-campus to on-campus ANOVA comparison. On the other hand, the on-campus zone's mean for "Walk or bike rather than taking the bus" (Statement 5) is higher than the Northeast and South zone means. The on-campus zone's mean for "Sort trash into proper receptacle (i.e., compost, landfill, etc.)" (Statement 14) is also higher than the East zone's mean. These results are again consistent with the the combined off-campus to on-campus ANOVA comparison.

SUBCATEGORIES. Figure 7 shows the mean action scores for on- and off-campus responses in the seven environmental behavior subcategories. The subcategory with the highest average response score for both locations is water consumption, followed by energy consumption. There is no statistically significant difference between average scores in all subcategories except for transportation, which has an average score of 2.9 for the on-campus zone and 2.3 for the combined off-campus zones.

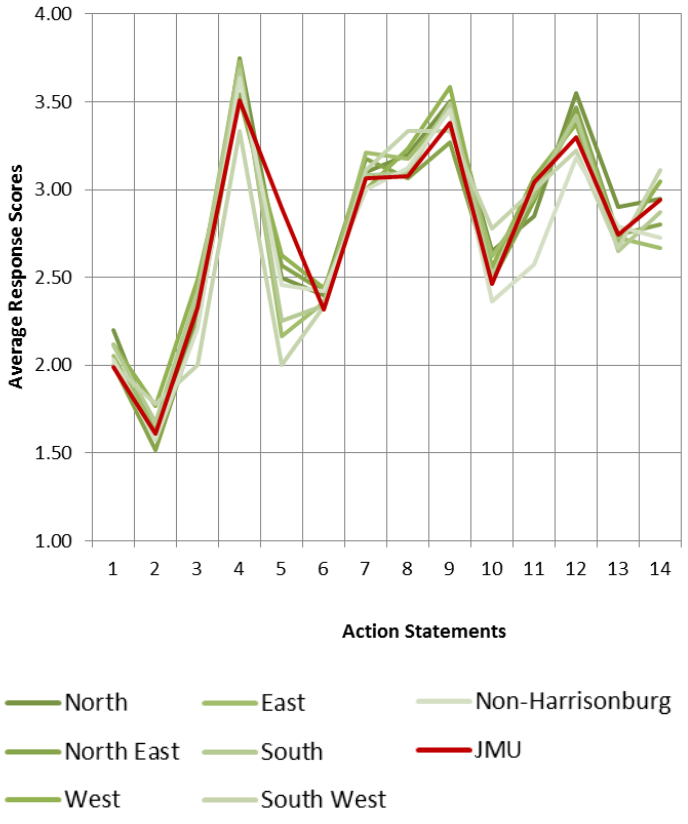

Figure 6. Average responses for the fourteen action statements in the eight on- and off-campus zones.

Value-Action Gap

A Pearson's correlation was calculated for each pair of value and action statements. The correlation produces a p-value that indicates whether or not a correlation exists and a number between -1 and 1 to evaluate the strength of the correlation. The strength of the absolute value of each coefficient was evaluated using the following scale: .00–.19 = *Very Weak*, .20–.39 = *Weak*, .40–.59 = *Moderate*, .60–.79 = *Strong*, .80–1.0 = *Very Strong*. The closer the correlation is to 1.0, the smaller the value-action gap. Table 2 shows the correlation between value and action statements for "All Zones," "On-Campus Zone" and "Off-Campus Zones." While there are moderate correlations between values and actions responses for all zones, the on-campus zone, and the combined off-campus zones, there are no statistically significant differences.

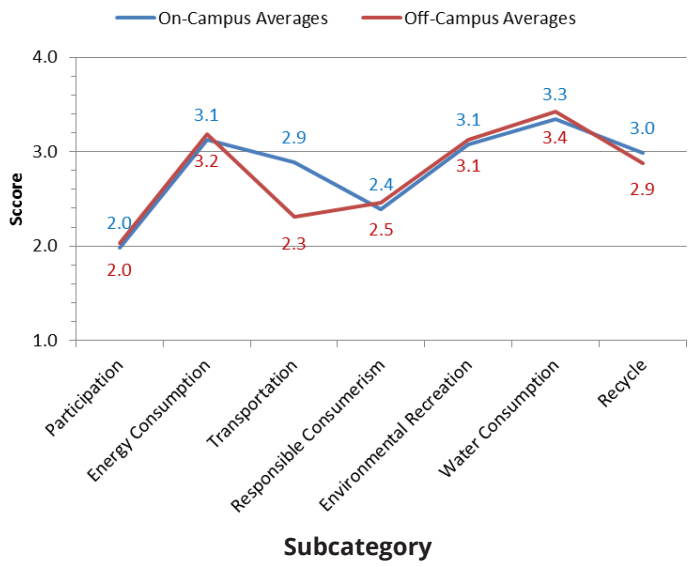

Figure 7. Average action scores for on- and off-campus responses in each of the seven environmental behavior subcategories.

For "All Zones" the strongest correlations are between Statement pairs 7, 8, and 13, indicating that JMU students as a whole reported acting on their values related to spending time outside and reducing air conditioning use more than they reported acting on their values for other statements. The weakest correlations are for Statement pairs 9, 10, and 12, indicating that students did not often report acting on their strong values related to conserving water, recycling, and minimizing waste.

Table 2

Correlation Between Each Pair of Value and Action Statements for All Zones, the On-campus Zone, and All Off-campus Zones.

No Correlation | Very Weak | Weak | Moderate | Overall Correlation

Value Statement	Action Statement	All Zones Correlation	On-Campus Zone Correlation	Off-Campus Zones Correlation
1. It is important to learn about new ways to protect the environment	Investigate new ways to protect the environment	0.31	0.32	0.31
2. I would volunteer to help clean up the environment	Participate in "green" events, such as Blacks Run CleanUp Day	0.35	0.34	0.36
3. It is a good thing to try to help others understand that nature is important	Help others understand the impact their actions have on the environment (i.e., encouraging friends to recycle)	0.36	0.37	0.35
4. It is a good thing to turn off the lights when they are not needed	Turn the lights off when they are not needed	0.32	0.04	0.35
5. Taking the bus, walking or riding a bike decreases a person's energy consumption	Walk or bike rather than taking the bus	0.03	0.01	0.02
6. It helps the environment to eat locally grown food	Eat locally grown food	0.29	0.24	0.32
7. It is important to go outside and enjoy nature as much as possible	Spend time outside for fun	0.44	0.40	0.46
8. Listening to the sounds of nature is an enjoyable experience	Notice the sounds of nature	0.54	0.51	0.57
9. There is no need to conserve water because there is so much water	Turn off the water when brushing your teeth	0.17	0.16	0.19
10. Recycling does not do enough good to make up for the harm we cause the environment	Buy recycled products	0.08	0.05	0.09
11. If I throw away plastic bottles it will not make a big difference because I am only one person	Separate recyclables from garbage	0.30	0.28	0.21
12. There is no need to reduce, reuse or recycle because humans are meant to use nature for their own benefit	Drink from a reusable water bottle	0.13	0.13	0.12
13. I use air conditioning whenever possible	Open the windows rather than turn on the air conditioning	0.45	0.43	0.47
14. Understanding which items should be put in compost, recycling and landfill bins takes too much time	Sort trash into proper receptacle (i.e., compost, landfill, etc.)	0.36	0.41	0.34
		0.57	0.56	0.58

The on-campus and off-campus zones show no difference in correlation except for Statement pairs 4, 10, and 14. There is no correlation for the on-campus zone for Statement 4 between the value and action statements related to turning off the lights when they are not needed, whereas the off-campus zone shows a weak correlation. This means that there is no relationship between on-campus students' beliefs and behaviors when it comes to lights, while off-campus students' higher beliefs might result in more frequent actions. Additionally, there is no relationship between belief in the efficacy of recycling and buying recycled products (Statement 10) for the on-campus zone while there is a very weak relationship for the off-campus zones. Lastly, the relationship between identifying recyclables and compostables and acting on this value (Statement 14) is weaker for the off-campus zones than for the on-campus zone.

Discussion

Value-Action Gap

Several results indicate a value-action gap in students at James Madison University as a whole. First, the percent of participants who chose environmentally favorable value responses is better defined and more concentrated than the percent of participants that chose environmentally favorable action responses. Figure 2 shows the distribution of all survey responses for the values section. More than 50% of respondents chose the most pro-environmental response, *Agree* for the preservation statements and *Disagree* for the utilization statements, for 10 of the 14 statements. In contrast, more than 50% of respondents selected *Always* for only three of the 14 action statements (Figure 5). The disparity suggests that participants had stronger pro-environmental values and less committed actions. The gap is even more apparent when considering that at least 80% of participants selected *Agree* or *Slightly Agree* for all eight preservation statements and *Disagree* or *Slightly Disagree* for three of the six utilization statements. In contrast, at least 80% of participants selected *Always* or *Often* for only two of the 14 action statements.

Another measure of the value-action gap is the correlation between value statements and their corresponding action statements. Table 2 shows a moderate correlation for all zones, the on-campus zone, and the combined off-campus zones. In other words, strong pro-environmental values did not always relate to more frequent pro-environmental behavior. This is consistent with the definition of a value-action gap (Howell, 2013). Additionally, because the difference between on-campus and off-campus correlation is not statistically significant, one location does not have a larger value-action gap than another. That is to say, it does not seem that location is a factor that affects the size of the size of JMU students' value-action gap.

Some value and action statement pairs do have stronger correlations at one location than another. For example, Table 2 shows that there is no correlation between values and actions for Statement pair 4, relating to turning off the lights, for the on-campus zone, but there is a weak correlation for the off-campus zones. This means that people who live off campus and believe it is important to turn off the lights when they are not needed are more likely to do so. The same can be said for Statement pair 14, which relates to sorting waste. Other statistically significant differences occur between the on-campus zone and the off-campus zones—for example, Statement pair 10, which relates to the efficacy of recycling—but the variation in responses between the on-campus and off-campus zones (0.04) is not significant In other words, a difference of 0.04 does not offer strong evidence of real-world variation. In sum, although location might not affect the value-action gap for all statements as whole, there are location-dependent variations in the size of the gap for different subcategories (e.g., responsible consumerism and recycling).

Moreover, there is significant difference in the size of the value-action gap when comparing the correlations of different statements. For example, there is less of a gap for Statement pairs 7, 8, and 13, which relate to recreation and energy consumption, than for Statement pairs 1, 2, 3, 6, and 11, which relate to participation in green events, responsible consumerism, and recycling. The weakest correlations—and thus the largest value-action gaps—are for Statement pairs 5, 9, and 12, which relate to transportation and water consumption.

Actions Section Subcategories

Figure 7 shows that two subcategories with low scores are transportation and responsible consumerism (Statements 5, 6, and 10). Figure 7 also shows that participation in green events (Statements 1, 2, and 3) was significantly the weakest subcategory. Table 2 shows that subcategories related to participation in green events and environmental recreation (Statements 1, 2, 3, 7, and 8) have weak or moderate correlation. These results support the work of Hebel et al. (2014), who found that behaviors that include interest in learning about the environment and participation in extracurricular activities correlate with pro-environmental beliefs.

Efficacy

Based on the Pearson's correlation for Statement pair 10, there is no relationship between belief in the efficacy of recycling and the act of buying recycled products (Statement 10) for on-campus respondents, while there is a very weak relationship for off-campus respondents. However, the difference between on-campus respondents and off-campus respondents is not significant. This result does not support

findings by Boyes and Stanisstreet (2012) and Malandrakis et al. (2011), who found that belief in the efficacy of a pro-environmental action increases the likelihood of that action.

Values and Actions

Despite there not being a difference in the size of the value-action gap between the on- and off-campus zones, Figure 8 shows that respondents in off-campus zones did have stronger overall values and actions. The four action statements on which off-campus students scored higher (Statements 4, 9, 12, and 13) indicate strong conservation in the water consumption and energy consumption subcategories. These actions may have been motivated by off-campus students' desire to pay less for utilities, while on-campus students cannot influence utility costs built into their room and board fees. Similarly, off-campus students' significantly higher PRE scores and lower UT scores in the 2-MEV analysis could be rooted in the factor of financial awareness. Off-campus students' higher mean age could also be a factor. Finally, on-campus students' pro-environmental responses for Statement 5 (transportation) and Statement 11 (recycling) could be because they walk to classes, cannot have cars, use the city transit system around town, and use the recycling and compost bins located in on-campus buildings. This result is especially interesting because it suggests that on-campus sustainability initiatives are proving effective.

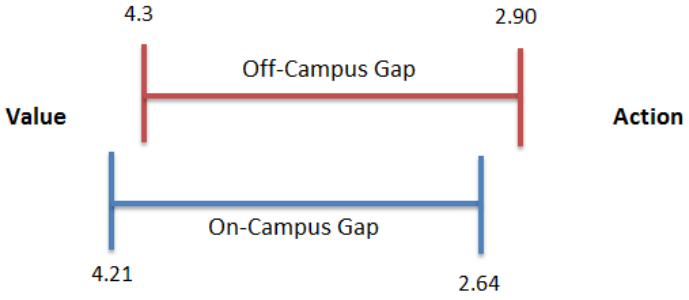

Figure 8. Visualization of the value-action gap with location considered as a factor. Numbers on the left indicate mean value scores while numbers on the right indicate mean action scores.

Conclusions

Previous studies have found that motivators such as peer influence (Carrico, 2009), efficacy (Boyes & Stanisstreet, 2012; Malandrakis et al., 2011), and education (Hebel et al., 2014) inform environmental values and actions. In most instances, this literature seeks to understand what factors influence values and then to determine if these values lead to more frequent actions. In the process, it underemphasizes the importance of understanding the values and actions of students in higher education and does not engage location as a possible factor. The present study has attempted to address these gaps in method and focus by examining university students' environmental values and actions on their campus and in their immediate community

The present study does not establish location as a direct motivator for change in values and action in the way that peer influence or education is, nor does it find that location influences the size of the value-action gap. It was hypothesized that any value-action gap would be wider in students who resided in off-campus housing compared to students who resided in on-campus housing, due to on-campus students' proximity to the university's numerous green initiatives. For example, the JMU campus offers resources, classes, alternative transportation, and recycling in close proximity to on-campus students' actual place of residence. By contrast, off-campus locations are not in as close in proximity to these green behavior support systems. Instead, the stronger values and actions exhibited by off-campus students contradict the initial hypothesis that on-campus students are more likely to engage in pro-environmental behavior because they are in closer proximity to green initiatives.

Limitations

The methodology that guided this project does not assume that values directly influence actions. Rather, it seeks understand how the factor of location influences values and actions individually and then attempts to determine if there are differences at each location. One key constraint on this approach came in the time allotted for participants to complete the survey. In order to make sure the survey would consume no more than five minutes, the values and actions sections were limited to 14 statements each. As a result, on the values side of the survey, there were eight preservation statements and only six utilization statements; similarly, on the actions side, the transportation subcategory had only one statement while the participation in green events subcategory had three. Future research could normalize data by evening out the statements in each value and action subcategory and adding a greater variety of environmental behaviors and actions.

A second limitation was the uneven number of students who responded from each zone, which made the ANOVA comparing results from the eight on- and off-campus zones inconclusive. For example, the Southwest zone only had nine completed responses while the on-campus zone had 409. This disparity could explain why the Southwest zone scored poorly in the 2-MEV analysis with the lowest preservation score and the highest utilization score. Future research could focus on achieving even sample sizes from each zone to provide more statistically significant evidence about students' values and actions.

Implications and Directions

The present study can offer directions forward for green initiatives at JMU and other university campuses:

- An environmental value-action gap does exist for both on-campus students and off-campus students.
- There is a moderate correlation between the values and actions within both groups, indicating that stronger values might lead to more frequent actions.
- Students have stronger pro-environmental values and less committed actions. The percent of participants who chose environmentally favorable value responses is better defined and more concentrated than the percent of participants that chose environmentally favorable action responses.
- Location is a factor when considering the strength of students' environmental values and actions as well as the 2-MEV for each location. Off-campus students had higher mean values and actions score than on-campus students.
- There are location-dependent variations in the size of the gap for different subcategories (e.g., responsible consumerism and recycling).
- There are significant differences in the size of the value-action gap when comparing the correlations of different statements (e.g., a smaller gap for recreation and energy consumption and a relatively larger gap for transportation and water consumption).

At the conclusion of this study, all data was stored with the JMU Office of Environmental Stewardship and Sustainability in a password protected file, and OESS intends to deploy the survey annually. Looking forward, the survey and surveys like it will need to be modified both to normalize data and to achieve more consistently significant results. In the process, now that location has been determined not be a strong stimulus, researchers could act to better understand the differences between the on- and off-campus gaps as well as the location-dependent variations in the size of the gap for different subcategories.

It is possible that location encompasses a number of different factors that might act simultaneously on students. Put differently, locations that have the greatest influence on a person's environmental behaviors might have a number of characteristics that make it easier to perform actions. Additional study would be needed to determine what characteristics Harrisonburg residential locations have and how these characteristics work together to impact students' beliefs and behaviors. For example, why do off-campus students have higher value and action scores than on-campus students? Are financial resources the underlying factor that causes off-campus students to conserve energy and water resources?

Do higher age or academic year correlate to stronger beliefs or more frequent behaviors? Based on the difference in mean age between on-campus and non-Harrisonburg respondents (19.02 and 25.15), researchers could consider how students' age informs their values and actions in comparison to younger students. A similar analysis could be performed to understand the influence of number of years of higher education and majors and career goals on behavior and belief. The difference in mean completed years of college at JMU between respondents in the on-campus zone (1.54) and respondents in all off-campus zones (3.2) could be a starting point for determining whether education is an influential factor. Additional research could associate students' majors and career goals with their response scores.

Alternatively, researchers could focus in on specific weak or strong subcategories and could work to better understand what factors actually do motivate students' pro-environmental actions. Why does the size of the value-action gap at JMU depend more on action—or inaction—than on values, and why are JMU students more likely to act on their values regarding recreation and energy consumption than they are for green events, responsible consumerism, recycling, transportation, and water consumption? Has JMU been more successful in investing students in some of its initiatives than others? Could JMU develop additional interventions that target specific behaviors.

These options—focusing more broadly on multiple motivators or more specifically on individual action subcategories—offer promising directions forward as researchers and planners interested in on-campus and community sustainability initiatives work to reduce JMU students' value-action gap.

Author's Note

Emma Martin ('16) earned her BS in Geographic Science, graduating as a member of Phi Beta Kappa. Ms. Martin's *JMURJ* "Environmental Value-Action Gap" article condenses her Honors thesis of the same title, which she presented at the American Association of Geographers Annual Meeting in San Francisco in 2016; Ms. Martin's work was also featured on the JMU Office of Environmental Stewardship Tour site.

Ms. Martin is currently working toward her MS in Environmental Sciences at Arkansas State University, where she serves as a graduate assistant in the Ecotoxicology Research Facility. Her Master's thesis research focuses on the relationship between vegetative coverage and water quality in two agriculturally dominated ditch systems in northeast Arkansas, with attention to the biodiversity of macroinvertebrates, reptiles, amphibians, and birds.

Ms. Martin enjoys birding, herping, plant identification, Settlers of Catan, and playing with her beloved cats. She plans to study amphibian ecotoxicology in the context of water quality.

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LOBBYING THE REGULATORY STATE: AN EXAMINATION OF REGULATION AND REVOLVING DOOR LOBBYING

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ABSTRACT

The prominence of lobbying activity in Washington, D.C., is well-known and often discussed by pundits and legislators alike. For those familiar with the practice of lobbying, it is not a secret that many former government employees become lobbyists and vice versa in a phenomenon often called the revolving door. Yet to be determined, however, is what leads to these so-called revolving door lobbyists and what factors contribute to a heightened number of them working on similar issues.

This study sought to determine if there is a relationship between the degree to which the federal government regulates a certain industry and the number of revolving door lobbyists representing the interests of that industry. This was accomplished by first determining a means of categorizing sectors of the economy and then assessing the federal regulatory burden placed upon each sector and the number of lobbyists active in each sector. Correlational analysis was then conducted to determine any relationship between the federal regulatory burden and the number of lobbyists. Results suggest a positive relationship between the federal regulatory burden and number of lobbyists—if there are more regulations, there will be more lobbyists. The analysis also allowed for the construction of a predictive model that can be used to determine the likely number of revolving door lobbyists active in a sector of the economy given a certain number of regulations relevant to the sector.

One of the greatest threats to a democracy is the erosion of its institutions from the inside out and, thus, the eradication of public trust in them. Revolving door lobbying, or at least the public's perception of it, is the prime example of this threat. I consider existing literature to determine the causes and nature of this phenomenon by which individuals move between working for the government and working in government affairs roles and conduct my own research on the explanatory and predictive capabilities of one potential cause.

After compiling data on individual lobbyists, their previous employment, and their clients, as well as data on the state of federal regulation, I conducted a quantitative analysis to examine the relationship between these variables. I ran regression analyses to determine the correlation between the test variables and use a marginal predicted values test to evaluate the model's predictive and explanatory capabilities. The results of these tests suggest that the higher the regulatory burden on an industry and the greater number of words making up those regulations, the more revolving door lobbyists there will be advocating on behalf of that industry.

Literature Review

Throughout the history of the United States, and particularly since the advent of statutory mandates for lobbying disclosure in 1995, the total amount spent on lobbying has grown. Since 1998, that amount has risen 217% from $1.45 billion annually to $3.16 billion annually in 2016 (The Center for Responsive Politics, 2019). One of the benefits of this requirement is the ability to study the *revolving door*—the phenomenon where those with government jobs on their résumés enter the business of influencing government—and how it affects policy making in Washington. The challenges of identifying revolving door lobbyists, hereafter referred to as *revolvers*, are due to definitional loopholes and the onus of responsibility falling upon the lobbyists themselves. Despite the vast existing literature on revolving door lobbying, the question of whether or not—and, if so, why—revolvers are more prevalent in some industries is still unanswered.

Why Interests Lobby

One of the main problems that interest groups face is the constant fluctuation in political priorities (LaPira & Thomas, 2017). The vast majority never receive attention. This inability to gain traction can be frustrating, especially for groups whose goals and interests are relatively inconsequential for the country as a whole (Baumgartner, Berry, Hojnacki, Kimball, & Leech, 2009).

Lobbyists aid clients in overcoming this hurdle by knowing when the political tides are turning. A skilled lobbyist with a keen sense of strategy will know the best time to push for a preferred policy and when to shift to a more defensive strategy (Kingdon, 1984). While this is likely the image that comes to mind for most people when they think of lobbyists, lobbyists also play an entirely different and equally important role in service of their clients. Many interest groups will retain lobbyists to monitor the workings of government, to report back on the state of law and regulation pertaining to their industry, and to provide expertise on a given policy area. For example, a parcel delivery service might retain a team of lobbyists to monitor the House Transportation Committee.

Some lobbyists only keep clients apprised of policy changes that may be implemented, while others also serve as de facto staff for the relevant Congressional committee(s). This opportunity to supply members of Congress with specialized information is relatively new. A decline in committee staff and nonpartisan bureaucratic analysts beginning in the 1970s has created a gap in Congress's information-gathering processes, affording lobbyists access to the very minds they hope to sway (Baumgartner & Jones, 2015).

The lobbying industry is one of influence and insurance. Lobbyists with valuable process knowledge and a keen sense of strategy play a monitoring role and tend to work the offensive, whereas lobbyists with policy expertise take up the defensive and provide political insurance for their clients by providing Congress with information it needs while casting that information in a light favorable to their clients' interests (LaPira & Thomas, 2017). The determination that interest groups must perform when hiring lobbyists is how to balance the two, a process that depends upon the regulatory climates surrounding their area of interest or industry.

Government Activity and Interest Group Mobilization

Given that it is the goal of interest groups to affect policy and the actions of government broadly, it seems logical that this interest group activity causes government activity. A study on the correlation of the growth of government and the growth of interest groups suggests that the activity of government actually serves as the demand-force (Leech, Baumgartner, LaPira, & Semanko, 2005). The researchers hypothesized that interest group mobilization would occur when two factors intersect: an opinion or need on the part of an interest group or a group capable of mobilizing resources to influence policy and the possibility of government action. This second factor led them to believe that interest groups with desires far outside of the current focus of government either do not exist or have a very low rate of success. They noted that the necessity of the possibility of government action is at the core of the definition of "interest" that Heinz, Laumann, Nelson, and Salisbury (1997) established

in their study of Washington lobbying titled *The Hollow Core: Private Interests in National Policy Making:*

> It is at the intersection of public policy and the wants and values of private actors that we discover interests. What we call the interests of the groups are not simply valued conditions or goals, such as material riches, moral well-being, or symbolic satisfaction. It is only as these are affected, potentially or in fact, by public policy, by the actions of authoritative public officials, that the valued ends are transformed into political interests that can be sought or opposed by interest groups. (p. 24)

To test their hypothesis, Leech et al. (2005) compiled data from over 45,000 lobby registration reports from 1996 to 2000 and measures of government activity from the Policy Agendas Project and examined at the issue area level the relationship between the frequency of congressional hearings and the number of firms active. The findings suggest that lobbying activity *follows* the government and that it is only after the government turns its attention to a specific issue area that interest group activity relating to that area begins to increase notably.

The Value of the Revolving Door

Because a legal requirement that lobbying activities be disclosed was only enacted in the mid 1990s, it has only recently been, established whether a trip through the revolving door benefits a lobbyist in terms of skill marketability or greater ability to generate revenue. Using reports filed by 637 contract lobbyists in accordance with the Lobbying Disclosure Act of 1995 (LDA), LaPira and Thomas (2017) examined the differences in annual revenue between conventional and revolving door lobbyists. Unsurprisingly, their findings showed significantly greater mean and median level revenue (measured by examining publicly-accessible LDA disclosure forms) among the revolvers (2.2:1 mean ratio and 3.3:1 median ratio, revolving door lobbyist revenue to conventional lobbyist revenue). With a difference of $181,075 in the mean revenue and a difference of $156,760 in the median revenue, there is strong evidence that previous government employment results in a higher degree of annual revenue.

LaPira and Thomas (2017) also looked into the differences in revenue among revolvers depending upon what position in government they had previously served in. For example, a former congressional staffer generated a median amount of $307,500 a year in revenue, whereas a lobbyist without previous congressional employment generated a median amount of $70,000 a year in revenue. Former congressional staffers earned $4.40 for every $1 earned by lobbyists with no previous congressional employment. While rare, former members of Congress (only 10 of the 637 lobbyists making up the sample population fit this description) generated the greatest amount of annual revenue. At the median, members-turned-lobbyists generated $454,120 in a year—roughly 648% of the median revenue generated by lobbyists without previous congressional employment (LaPira & Thomas, 2017).

While the data and findings do not necessarily reflect the compensation of lobbyists, LaPira and Thomas (2017) operate on the general assumption that lobbyists' reported revenue is a reliable indicator of their compensation as lobbyists. Given this assumption, the findings can lead to the conclusion that passing through the revolving door increases the salary of someone with previous government employment, which is an indicator that interest groups find their unique background particularly valuable.

Explaining the Phenomenon

There are two schools of thought for explaining why revolvers are more effective and therefore more highly valued than conventional lobbyists. The first school believes that revolvers are more highly valued due to the connection-dependent nature of Washington and the advantage gained from having a network of individuals inside the policymaking establishment. The second school—the one most often subscribed to by lobbyists—believes that prior government service provides an individual with greater process-related knowledge. Having already worked within the policymaking apparatus either as a member or a staffer, this individual will have a deeper understanding of the nuance and underlying norms of procedure that govern the operations on Capitol Hill (Blanes i Vidal, Draca, & Fons-Rosen, 2012).

Differential Efficacy of the Revolving Door

Despite data showing that revolvers have a measurable amount of particular process knowledge and a significant degree of professional socialization (Salisbury, Johnson, Heinz, Laumann, & Nelson, 1989), these factors do not necessarily translate to tangible successes when it comes to specific legislative goals. The fact that revolvers generate significantly more revenue and are therefore more highly valued than conventional lobbyists (LaPira & Thomas, 2017) does not answer the question, "Are revolving door lobbyists more effective than conventional lobbyists?"

A Different Point of View

In considering the causes behind the disproportionately higher value placed upon those who have passed through the revolving door by firms and clients, it only seems rational to consult with the lobbyists themselves. They represent their clients' interests and, as such, have particularly privileged insight into how they carry out this project and what, if anything, from their previous employment makes them especially adept at doing so.

An analysis of 776 interest representatives and subsequent interviews that they sat for between 1983 and 1984 revealed how lobbyists feel about their experience in government (Salisbury et al., 1989). Some 80% stated that their previous employment in government provided an increased degree of familiarity with the decision-making process, while 70% said that it provided them familiarity with issues pertaining to their contracts. Of those who had worked in the executive branch only, 53% said that their previous employment provided them with contacts within the administration. On the other hand, of those who had worked in Congress only, a staggering 87% reported that their previous employment provided them with contacts within Congress (Salisbury et al., 1989).

The findings of Salisbury et al. (1989) suggest that lobbyists place a very high value on their previous government employment. Their testimonies support the second school of thought in that they attribute the disproportionately higher value of revolvers to their knowledge of the process. Upon disaggregation, Salisbury et al.'s findings also support the first school of thought, although mostly only in the case of those who had previously served in Congress.

The Bureaucracy: A Second Revolving Door

While many revolvers come from Congress, notable interest group activity surrounds the executive branch as well. There was, however, almost no data on lobbying in administrative agencies up until 2013. This is likely due to the fact that the term "lobbying" typically elicits an image of interests conveying their wishes to individuals who will make a decision on policy at some point in the future and not to those who will be tasked with implementing said policy. Given that the administrative bureaucracy does not typically have this sort of authority (at least not to the degree that Congress does), the activity of interest groups in this branch of government went mostly overlooked until a 2013 paper by Boehmke, Gailmard, and Patty.

LDA reports from 1996 show that of 9,388 incidents of interest groups lobbying at the federal level, 3,817 occurred within the administrative agencies. Nearly 41% of lobbying occurred in the executive branch. In addition, 3,601 of the 5,570 groups that lobbied the legislative branch also lobbied the executive branch, meaning that over 64% of interest groups that actively lobbied Congress also had lobbyists working somewhere within the administrative bureaucracy (Boehmke et al., 2013).

These findings suggest that interest groups are aware of the importance of being heard by policymakers as well as by policy implementers, and that they are actively mobilizing across governmental venues. In the context of revolving door lobbying, it also seems to suggest an entire submarket of former government officials that are marketable to lobbying firms and clients as having special knowledge of the political process and a high degree of professional socialization. Given the conclusion that previous government service typically results in higher levels of generated revenue (LaPira & Thomas, 2017) and that connections to individuals still inside government correlate with higher revenue (Blanes i Vidal et al., 2012), it is not unlikely that former bureaucrats are similarly more highly valuable as professional lobbyists.

The Growth of Regulatory Burden

In light of the theory of lobbying as an insurance policy against the uncertainties of government (LaPira & Thomas, 2017), it follows that these uncertainties need to be quantified in a manner that is easy to understand and analyze. As a part of an ongoing project to measure the growth of the Federal Register (the official collection of the agency rules, proposed rules, and public notices of the federal government), scholars at the Mercatus Center have done just that (McLaughlin & Sherouse, 2017). Utilizing a text analysis algorithm that searches for keywords, they constructed a database of regulatory constraints in the Code of Federal Regulations (the actual codification of the rules and regulations of the federal agencies and executive departments) in a given year and the applicability of those constraints to various industries as categorized by the North American Industry Classification System (NAICS).

This project, known as RegData 3.1 in its current rendition, demonstrates the accumulation of regulatory restrictions over time. Between 1970 and 1981, restrictions were added at a rate of about 24,000 per year. This pace slowed only slightly over the next half decade before picking back up to 18,000 restrictions per year from 1985 to 1995. A decrease of 27,000 restrictions occurred from 1995 to 1996, which coincided with the Republican Revolution and the passage of many components of Speaker Gingrich's Contract with America, which were intended to deregulate the U.S. economy. In the two decades since, the number of regulations identified in the Code of Federal Regulations has grown by about 13,000 restrictions per year (McLaughlin & Sherouse, 2017).

While the data only covers the past half-century due to the publication of yearly revisions to the entire code beginning in 1967 (McKinney, 2018), it does suggest that the general trend, irrespective of party control of Congress or the Presidency, is that the number of regulations on the books increases over time. As early as 1988, Shapiro and Glicksman observed that this trend is concurrent with the trend of increased legislative vagueness and the transfer of discretion to the administrative bureaucracies. Perhaps not coincidentally, the 1970s saw the abolition or defunding of nonpartisan research agencies,the decline in congressional committee staff (Kramer, 2017), and the rise of revolving door lobbyists in Washington.

While existing literature paints a general picture of the lobbying industry and provides insight into the role revolvers play, it does not address two fundamental questions regarding the demand for this special type of lobbyist. First the historical collection of literature does not include a focused, quantitative analysis of the revolving door phenomenon and how and why it might vary across different parts of the economy. Second, it has yet to be shown whether a relationship exists between the actual number of restrictive regulations relevant to an issue category (a level of classification for sections of the economy created by the Center for Responsive Politics) in the Code of Federal Regulations in a given year and the number of revolving door lobbyists representing clients classified within that category in the same year. The following sections analyze Lobbying Disclosure Act data compiled by the Center for Responsive Politics and the outputs of the RegData 3.1 algorithm from the Mercatus Center to determine if the data shows a positive relationship.

Theory and Hypotheses

The causal chain I propose is as follows: the destaffing of congressional committees and the erosion of nonpartisan research and analysis agencies led to increased vagueness in the language of legislation passed by Congress. This vagueness shifted responsibility to the executive branch where bureaucrats were tasked with interpreting the legislation, making determinations about what it actually prescribed, and filling in the gaps left by the legislature. This led to an increased tendency to go over and above the actual intended purpose of a piece of legislation.

Bureaucrats typically spend their entire careers within their respective agencies, and become skilled at administering the various programs and policies of the federal government. They are accustomed to taking what is required of them by law and doing it. When they are given the opportunity and responsibility to interpret vague laws and to even fill in large gaps on their own, they will gravitate to over-regulation. This does not mean that bureaucrats are sinister or advantage-seeking, nor does it mean that they are fearful of being reprimanded in some way if they do not act. Instead it is simply that their jobs make them prone to overestimate the ability of government and to get carried away with what might otherwise be seen as a vague, yet still constraining statute.

As a result of this overregulation, businesses have seen an increasingly more hostile and uncertain regulatory climate and have, in turn, adapted their lobbying strategies to deal with the uncertainty. These adaptations include, most notably, an increased demand for revolving door lobbyists who have the knowledge necessary to understand the political processes and who can keep their clients apprised of any upcoming changes to relevant regulatory frameworks. Additionally, lobbyists with policy experience were well-positioned to fill the information-gathering gap for Congress as they used their access to advocate for their clients (Baumgartner & Jones, 2015).

Existing literature suggests that it is the demand effect of the level of government activity rather than the supply effect of the number of active lobbying firms that determines the degree of interest group mobilization and the volume of lobbying activity relevant to the issue areas in which the government is active (Leech et al., 2005). While Leech et al. (2005) focused on congressional lobbying and the activity of the federal legislature (measured primarily by the number of congressional hearings), it illustrates a notable trend in the world of lobbying that I think can be observed when it comes to the regulatory activity of the executive branch and, more specifically, the professional bureaucracy.

From this causal explanation, I deduce the following hypotheses: If there is a greater number of regulations in the Code of Federal Regulations for a given industry category in a given year, then there will be a greater number of revolving door lobbyists with clients who are classified within that category in the same year. If there is a greater number of regulatory words in the Code of Federal Regulations relevant to a given industry category in a given year, then there will be a greater number of revolving door lobbyists with clients who are classified within that category in the same year.

Methodology

To test my hypotheses, I performed a cross-sectional observational study of federal lobbying disclosure data, data relating to the number of restrictive regulations at the federal level, and the number of regulatory words making up those regulations (Al-Ubaydli & McLaughlin, 2014). Organizing the data by industry category (a subsection of the economy formulated by the Center for Responsive Politics) provided variation in the dependent variable, as the regulation data was organized and filtered by industry according to the North American Industry Classification Systems (NAICS). This pairing of lobbying and regulation data allowed me to investigate the variations in the frequency of revolvers with clients in a certain industry category and how these variations correlate with both variations in the number of restrictive federal regulations and variations in the number of regulatory words relating to the same industry category.

It should be noted that the incommensurable formats of the data sources necessitated a degree of cross-tabulation, which inevitably gave room for subjectivity. The lobbying

data sourced from the Center for Responsive Politics (2019) was organized by their proprietary, three-tiered organizational scheme. The regulation data sourced from the RegData project at the Mercatus Center was organized by the more modern and entirely different NAICS system. This incompatibility meant that I needed to perform a manual translation between the CRP system and the NAICS system so that the available regulation data could be paired with the appropriate categories according to CRP's proprietary scheme. In carrying out this manual procedure, I utilized the NAICS database and the descriptions located on the United States Census Bureau's website (Office of Management and Budget, 2017) and only committed to a translation if there was significant assuredness that the NAICS category being considered did, in fact, correspond to the CRP category being considered. While many acceptable matches were found, there were many instances where a match between the two categorization systems could not be found. There were also instances where the same NAICS code was paired to more than one CRP code, resulting in the need to select only one pairing for use in my analysis. In determining which duplicates to use, I considered the similarity of each category to other categories that already had a match made was considered. If one of the duplicate categories was notably similar to another category already matched, I omitted it and opted instead for the duplicate that was likely to increase the diversity of my sample.

Organizing the data by CRP category resulted in a data table with individual rows for each of the industry categories and individual columns containing four test variables: number of lobbyists with clients in said category in the observation year, number of revolving door lobbyists with clients in said category in the observation year, number of restrictive federal regulations pertaining to said category in the observation year, and number of relevant regulatory words pertaining to said category in the observation year.

Two pairwise correlation tests were performed to determine if a correlation existed between the number of revolving door lobbyists in each category and the two dependent variables (the number of restrictive regulations and the number of relevant regulatory words pertaining to each industry category). The output of this test included both a Pearson's r-value and a probability value (p-value). The r-value summarized the magnitude of the linear relationship between the two pairs of variables, whereas the p-value indicated whether my predictor variables (the number of restrictive federal regulations and the number of relevant regulatory words) were useful in predicting the number of revolvers. If a predictor value was less than 0.05 ($p<0.05$), there was no difference between the means of the variables, and it could be concluded that a significant difference existed and that the predictor variable was, in fact, useful in predicting the dependent variable. This would essentially result in the ability to assume the validity of the research hypothesis and to reject the counterclaim to it (the null hypothesis).

After determining that the null hypothesis could be rejected, two negative binomial regression analyses were conducted. Due to my data being count data, meaning that I was Zmerely counting my variables (number of revolving door lobbyists, restrictive regulations, and regulatory words), a standard linear regression would likely produce negative predicted values, which are theoretically impossible because there could not be a negative number of revolving door lobbyists. The output of these regression analyses provided a number of useful figures, such as the beta, which is a measure that can be used in determining the likelihood of a change in the dependent variable given a change in an independent variable.

The model has both explanatory and predictive capabilities, providing a quantified measure of the degree to which the two pairs of variables are correlated and an equation that can be used to predict the frequency of revolving door lobbyists with clients classified within a given industry category given the number of restrictive federal regulations or the number of relevant words contained within the Code of Federal Regulations.

Data and Discussion

After performing the cross-tabulation described above, the remaining sample size (n) was 98. This served as the number of observations used for the actual data analysis. I have included the table below, which includes descriptive statistics for each of the variables being used in this analysis.

I performed a pair-wise correlation test, resulting in a correlation table containing a number of Pearson r-values and indications of whether or not the two variables for which these r-values correspond are significantly different. The r-value for the frequency of revolvers and the number of restrictive regulations at the federal level in 2015 is 0.2895. The p-value for these two variables is less than 0.01, meaning that there is statistical significance between the two variables and that the null hypothesis can be rejected with 99% certainty. The r-value for the frequency of revolvers and the number of relevant words in the Code of Federal Regulations in 2015 is 0.2646. The p-value for these two variables is less than 0.01, meaning that there is statistical significance between the two variables and that the null hypothesis can be rejected with 99% certainty.

Turning to the regression analyses, the pairing of the frequency of revolvers and the number of restrictive

Table 1
Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Frequency of Revolvers	98	60.09524	77.5397	1	579
Restrictive Regulations	98	18513.18	26172.31	228.9442	126883.4
Relevant Regulatory Words	98	1782400	2532941	21152.58	141000000

regulations at the federal level in 2015 was considered. The negative binomial regression resulted in a beta of 0.0000137, a standard error of 0.000044, and a z-score of 3.08. I also looked at the pairing of the frequency of revolvers and the number of relevant words in the Code of Federal Regulations in 2015. The negative binomial regression for these variables resulted in a beta of 0.00000136, a standard error of 0.00000473, and a z-score of 2.87.

The betas from the two negative binomial regression tests are indicative of the slope of a regression line. They are more useful, however, in determining the likelihood that the frequency of revolvers will increase given a certain increase in the independent variable being considered. This predictive capability is visualized in Table 2 and Figure 1 (for the number of regulations) and Table 3 and Figure 2 (for the number of regulatory words).

In Table 2 and Figure 1, artificial reference points along the independent variable were created at increments of 25,000. Each of these increments has a corresponding marginal predictive value—the predicted number of revolving door lobbyists representing clients within a given industry category given the number of restrictive regulations being considered. For example, if there were 75,000 restrictive federal regulations impacting the sugar beet farming industry, there would be, according to the model, approximately 135 revolving door lobbyists (134.5307) with clients categorized within the sugar beet farming industry according to CRP's classification scheme.

The same has been done in regards to the number of regulatory words as the independent variable in Table 3 and Figure 2. Due to the significantly greater values in this variable than in the preceding one, I made the increments greater, at every five million. As with the number of

Table 2
Predictive Model (Regulations)

Independent Variable Event (# of regulations)	Marginal Predicted Value (# of revolvers)
25,000	67.84269
50,000	95.53493
75,000	134.5307
100,000	189.4438
125,000	266.7715

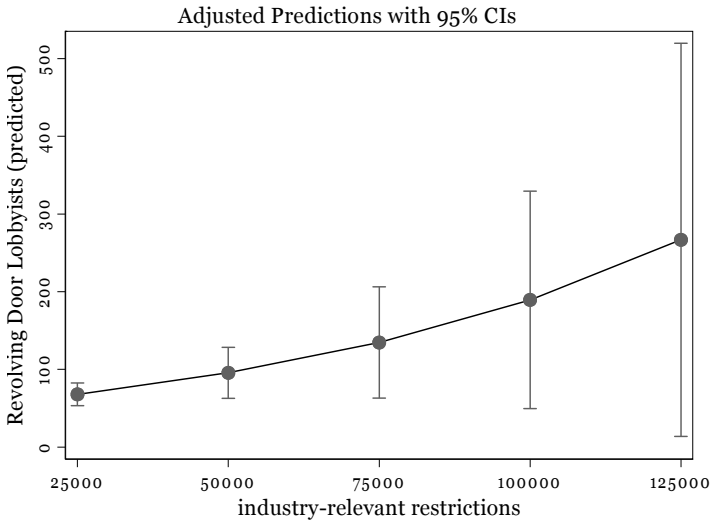

Figure 1. Predictive Model (Regulations)

regulations, each of these increments has a corresponding marginal predictive value—the predicted number of revolving door lobbyists representing clients within a given industry category given the number of regulatory words being considered. Continuing with the earlier example, if there were 15,000,000 regulatory words impacting the sugar beet farming industry, there would be, according to the model, approximately 377 revolving door lobbyists (376.8755e) with clients categorized within the sugar beet farming industry according to CRP's classification scheme.

Table 3
Predictive Model (Relevant Words)

Independent Variable Event (# of words)	Marginal Predicted Value (# of revolvers)
5,000,000	96.87115
10,000,000	191.0716
15,000,000	376.8755
20,000,000	743.3608

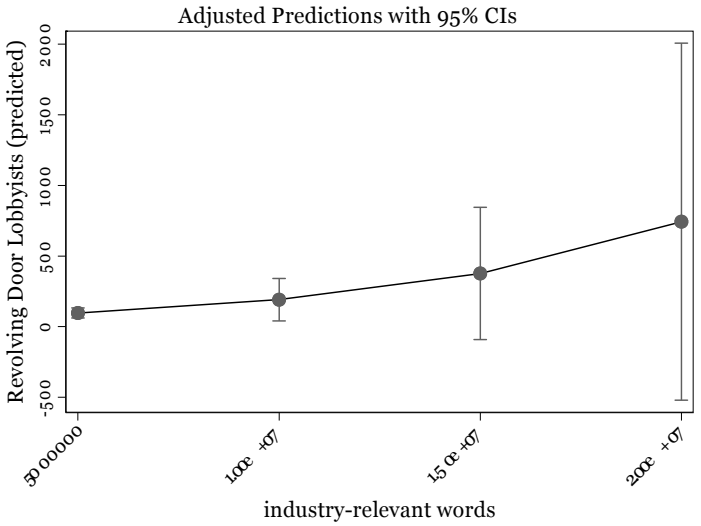

Figure 2. Predictive Model (Relevant Words)

Conclusion

Since lobbying data has become available over the past two decades, social scientists have been able to track the lobbying industry and identify trends within it that might be particularly impactful to our democracy. The trend that has probably garnered the most attention aside from the rapid growth in the amount spent on lobbying activities has been the prevalence and growth of the revolving door phenomenon.

The pundits in media and the public tend to ascribe the growth of this phenomenon to the corrupt nature of politicians or to the inescapable temptations of "the swamp." In reality, however, the reason has more to do with the special knowledge and skills that government experience affords than institutional corruption or the oligarchical tendencies of elected officials. In the hopes of determining one of the reasons that the demand for these lobbyists with government experience is so high, I built upon the works of LaPira and Thomas (2017), among others, to examine the relationship between the growth of the so-called "regulatory state" and the revolving door. Literature suggests that the rise in revolving door lobbying has coincided with both the rise in the number of federal regulations and the increased vagueness of legislation stemming from the destaffing of key committees in Congress. It would seem, then, that the growth in regulation is at least partly a factor in explaining why the number of revolving door lobbyists continues to grow.

This argument was evaluated by examining subsectors of the economy and the prevalence of revolvers, regulations, and regulatory words in relation to them. Using CRP's Lobbying Database and the regulation data made available by the Mercatus Center's RegData project, I compiled a dataset that could be used for further analysis. Finally, I ran two separate negative binomial regressions—one between regulations and revolvers and one between regulatory words and revolvers—to investigate the relationships.

The regression analyses supported both my research hypotheses. In both regressions, I found a positive correlation between the variables being examined. The output data of each of these analyses also allowed for the construction of a predictive model that could be used to determine the likely number of revolving door lobbyists active in an industry category given a certain number of regulations or of regulatory words relevant to the category.

Despite the support for this hypothesis, the sample size was small. It could have been increased if there had been greater time and resources to conduct a more thorough cross-tabulation between the CRP and the NAICS classification systems. Performing a more thorough examination of the CRP and NAICS categories would have allowed the identification of more pairings, which would have increased the number of CRP categories available to me when I searched the RegData files for regulation data and would have led to a larger number of observations included in the analyses.

My sample size was also constrained by the available regulation data in the RegData outputs. There were a number of instances where data on the volume of regulations corresponding to a certain NAICS code was not located. I cannot speak to the reason why such data was not included in the RegData outputs; however, my assumption is that

it stems from a lack of sufficient data for the RegData algorithm to identify regulatory language that would correspond to those NAICS codes.

Despite these shortcomings, the analyses produced results that can be utilized in further research on the revolving door phenomenon. In addition to dedicating more time and resources to completing a comprehensive cross-tabulation, future researchers might also consider adding a temporal element. This would allow for an examination of whether the relationship between the regulatory burden and the prevalence of revolving door lobbyists has existed in the past and, if it has, whether or not it has been strengthening, weakening, or remaining constant. A future researcher might also devise a way to assess each regulation for "burdensomeness" or how much money and time would need to be dedicated to complying with each regulation. This approach would allow for an analysis of the effects of not only the volume of regulations on the revolving door phenomenon, but also the effects of the felt weight of those regulations.

It should also be noted that the increased volume of regulations is certainly not the only factor contributing to the prevalence of revolving door lobbyists. The volume of regulations on a given industry certainly possesses explanatory capabilities, but it is only part of the explanation. Other likely factors include the mean market value of the business entities within each industry and the frequency of litigation undertaken by business entities within each industry. It is probable that an industry category containing businesses with more assets and businesses involved in more litigation will have a greater frequency of revolvers representing businesses in that category.

In sum, this research is useful in answering a fundamental question concerning the nature of our government, the way it implements policy, and the types of individuals who seek to influence it. An increase in the regulatory burden placed upon an industry does correlate with an increase in the number of revolving door lobbyists representing clients within that industry.

Author's Note

Charles Lowrance III ('18) graduated in 2018 with a Bachelors degree in Political Science and Philosophy. He is pursuing a career in policy and legislative affairs. He hopes to contribute to the development of policy that increases and diversifies the production of reliable and affordable energy and that reduces federal restrictions that limit access to public lands and stifle economic growth.

"Lobbying the Regulatory State: An Examination of Regulation and Revolving Door Lobbying" builds on research by Dr. Timothy LaPira of James Madison University's Political Science Department. Mr. Lowrance is grateful to Dr. LaPira for his brilliant and passionate guidance throughout the process and to Shelby Taraba ('18)—friend and classmate—for her support throughout the writing process.

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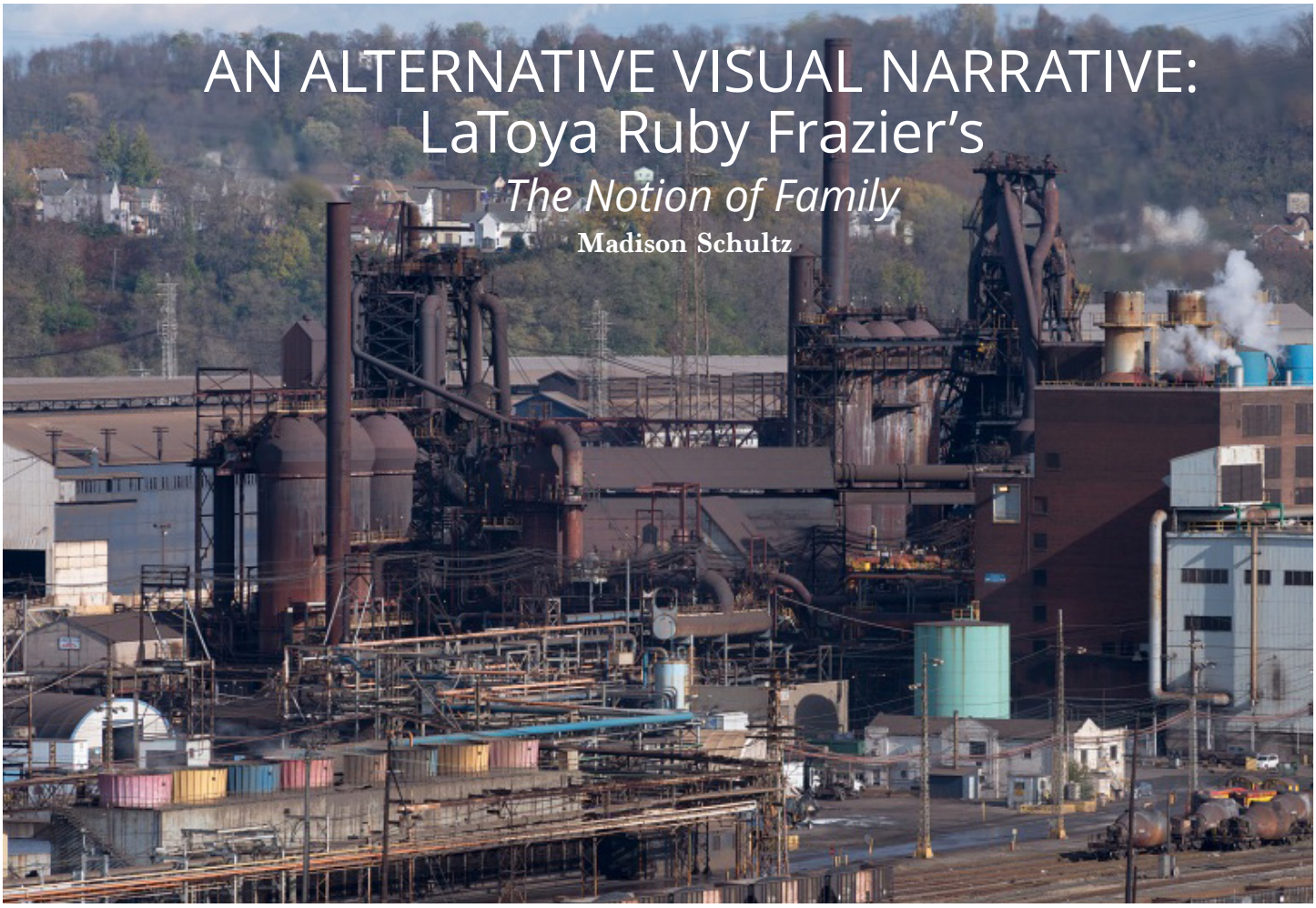

AN ALTERNATIVE VISUAL NARRATIVE: LaToya Ruby Frazier's *The Notion of Family*

Madison Schultz

ABSTRACT

LaToya Ruby Frazier's body of photographic work titled *The Notion of Family* (2003-2014) explores the toll the steel industry in Braddock, Pennsylvania, took on the black community there. The history of black Braddock is riddled with social, political, racial, economic and environmental hardship spurred on by the steel industry. Frazier intimately chronicles the lives of three generations of women—herself, her mother, and her grandmother—and their place in that history. The alternative visual narrative that Frazier creates commands viewers' attention in telling a story that has been largely ignored by the American public. This essay contrasts Frazier's work with that of painter Robert Qualters and photographer Barbara Peacock to assess how her images differ from other efforts to chronicle memory and history in small American towns.

In 2014, after eleven years of documentary work, LaToya Ruby Frazier shared *The Notion of Family* with a society whose racial tensions were reaching a boiling point. Her award-winning photobook follows three generations of African American women in Braddock, Pennsylvania—herself, her mother, and her grandmother. Home to Andrew Carnegie's first steel mill and the first U.S.-based Carnegie library, Braddock has for more than a century also been home to an African American population that has been segregated, subjugated, and exploited. Frazier's work reveals this hidden history, examining the toll the steel industry and racial exclusion has taken on Braddock and on her family.

Frazier's activism sets *The Notion of Family* apart from contemporary documentary art that offers more nostalgic representations of childhood memory and history. In 2015, the book won the Publication category of the International Center of Photography Infinity Award, an award intended "to bring public attention to outstanding achievements in photography by honoring individuals with distinguished careers in the field and by identifying future luminaries" ("Infinity Awards"). Elsewhere, *The Notion of Family* has been hailed for acknowledging and expanding on "the traditions of classic black-and-white documentary photography" as it "tackles contested territory" ("About"; Gavin). For Frazier, art is a weapon: "Through reclamation of our narrative, we will continue to fight historic erasure and socioeconomic inequality" (Frazier, "A Visual History"). This essay examines Frazier's *Epilepsy Test* from *The Notion of Family* alongside Robert Qualters's oil-on-canvas *Braddock, Maple St.* and Barbara Peacock's *Parent's Market, 1982* from her *Hometown* photobook to assess how Frazier's images differ from other works that chronicle memory and history in small American towns.

Frazier's activism sets The Notion of Family *apart from contemporary documentary art that offers more nostalgic representations of childhood and memory.*

Before turning to close reading, it is important to contextualize Frazier's work within the history of Braddock in the eastern suburbs of Pittsburgh. The African American community that shaped Pittsburgh is often excluded from mainstream narratives that champion Braddock as "a poster child for Rust Belt Revitalization" (Frazier, "A Visual History"). In her conversation with Dawoud Bey, Frazier recounts purchasing the book *Images of America: Braddock, Allegheny County* during a 2009 visit to Braddock's Carnegie library:

> By the time I turned to the last page I realized that all the African Americans who had contributed to this great history were excluded. This continued omission, erasure, invisibility, and silence surrounding African American sacrifices to Braddock and the American grand narrative is why I've chosen to work with a twentieth-century documentary aesthetic. It's also the reason why it is necessary to tell the story of three generations of women whose lives parallel the rise and fall of the steel mill industry—and to tell how we survived the subsequent thirty years of disinvestment and abandonment by local, state, and federal governments. (Frazier and Bey 152)

As Pittsburgh became a manufacturing center in the mid-1800s, it also became an arena for intense labor strife. Labor unions began to form and then organize strikes against the steel giants. These unions were racially exclusive, so the only opportunity for African American workers to enter the industry came in the mid-1870s as strikebreakers. In 1910, agricultural depression and natural disasters in the south and heightened demand for industrial workers in the north resulted in a mass northbound migration of African Americans (Dickerson 137-38). This Great Migration during the steel industry's heyday brought Frazier's family to Pittsburgh. Braddock was a hub of industry and commerce, and Frazier's family, including her grandfather, helped build its history as steel workers.

Caught in this fracturing, African American workers were segregated geographically and subjugated in lower-level, manual-labor jobs.

The dynamics of the region began shifting through the 1920s to the 1950s. In *Beyond Rust: Metropolitan Pittsburgh and the Fate of Industrial America*, Allen Dieterich-Ward notes that "The area's rugged topography . . . coupled with the ethnic diversity of hundreds of thousands of new blue-collar residents and the ability of corporations to manipulate municipal boundaries resulted in a political configuration that was as fractured as the economy was integrated" (2). Caught in this fracturing, African American workers were segregated geographically and subjugated in lower-level, manual-labor jobs.

In the 1960s, Braddock's steel industry began to collapse. An industry-wide strike drove steel mills to bankruptcy and sent the industry into an unusually severe decline. As Corinne Segal recounts in a 2015 PBS article based on an interview with Frazier, the population in Braddock decreased and infrastructure crumbled as white residents moved away, leaving "communities of color that were frequently barred

from getting loans to buy homes elsewhere." This diminished Braddock is the one that Frazier's mother knew in her adolescence. During the 1970s, a revitalization movement referred to as the Pittsburgh Renaissance came about. Critics of the movement argued that revitalization forced a modernist vision on stagnating mill towns, which resulted in "an uneven transformation that laid the foundation for the social bifurcations still evident in metropolitan Pittsburgh today" (Dieterich-Ward 4).

Frazier collects the remnants of this strife-riddled history in *The Notion of Family,* featuring images of her grandparents' physically-spent figures as well as the mangled remains of buildings and other structures in Braddock. In her photography, viewers see a family that has been both bound and weathered by the history it has experienced and steel mills and industrial complexes whose glory has departed. With a profound understanding of the fullness of Braddock's history and her family's place in it, Frazier's photography articulates the "intersection of the steel industry, the environment, and the health care system's impact on the bodies of [her] family and community" (Frazier, "A Visual History").

Frazier collects the remants of this strife-riddled history in The Notion of Family.

Epilepsy Test, a diptych that juxtaposes a worn human body and a decimated structure, represents the thematic subject matter of *The Notion of Family* as a whole. One photograph features the back of an African American woman in an open hospital gown. The other features a dilapidated building strewn with fallen metal, tangled wires, and other debris. The composition of the image connotes a sense of malady. The wires attached to the woman's body in the image mimic the wires hanging haphazardly from the abandoned structure on the right. The deserted nature of the building speaks to the worn, even spent nature of the person alongside it. Next to the lifeless wires of the old structure, these medical wires do not suggest revitalization. This plainly is not an optimistic picture of someone receiving life-giving medical care.

The lines in both images are slanted—they do not fall precisely perpendicular to the edge of the frame. This skewing implies a fallen state. Where straight lines might suggest a sense of uprightness, polish, or wholeness, the slanted lines (in conjunction with the subject matter of the photographs) let viewers know that something has been lost here. These bodies and structures are no longer upright, no longer polished, and no longer whole.

Epilepsy Test, from *The Notion of Family.* LaToya Ruby Frazier.

The framing is also important. Blurred material to the left of the woman's body gives viewers a sense that they are looking in on the scene: *this is not their story*. However, the closeness of the shot and the vulnerability of its subject asserts a compelling urgency about the moment and the larger story it tells. The image seems slightly overexposed, as it accentuates shadows and lacks pure white highlights. The darkness cements a solemness about the story being displayed. Because the image is scarcely lit—detecting certain details requires some strain on the part of the viewer—the scene also appears ominous. The effort alerts viewers: they must pay close attention.

These bodies and structures are no longer upright, no longer polished, and no longer whole.

Like Frazier, Robert Qualters chronicles both the history of Pittsburgh and an individual's memories and experiences within the place. Under closer examination, though, the two artists tell different versions of the story. Qualters portrays the dominant narrative of Pittsburgh and has been hailed as a "quintessential Pittsburgh artist" (Thomas and Guidry). Qualters's early memories of his hometown include details like "fifteen-minute radio programs called serials" and "gritty, shiny specks of stuff from the steel mills on the snowy street" (Clarke ix). In contrast, Frazier speaks of her past in terms of "environmental toxicity and pollutants and systemic racism" (Sargent).

A visual comparison cements these differences. Both Frazier and Qualters use multiple scenes to depict a single place, which speaks to the multifaceted nature of Pittsburgh and its narratives. Qualters's *Braddock, Maple Street*, painted in 1986, features five different scenes on the titular street. In the largest image on the top left, children play in the street, which is reminiscent of Qualters's own memories of his formative years in the Pittsburgh suburbs. A woman traveling home with what appears to be a brown bag of groceries represents another staple of daily life for middle-

Braddock, Maple St.. Robert Qualters.

or working-class individuals. In the background, workers, both black and white, cheerily complete tasks. It appears that the building in the image is being constructed or perhaps even revitalized by these blue-collar workers. The scene stands in stark contrast to Frazier's diptych, where working-class bodies take the foreground and the demise—not the reconstruction—of structures and lives is emphasized.

The bottom frames of Qualters's work depict two old steel mills. In the left panel, the monochromatic grays and blues convey the notion that this place once held glory, but it is no longer thriving. However, the romanticized images of small-town life in the other frames are evidence that although this structure has lost its vitality, it has not robbed the city itself of animation. The shadows on the buildings denote the sun rising behind viewers of the scene. Coupled with the comforting and nostalgic pink hue of the entire piece, this allusion to a rising sun hints that the community not only has a future to hope for, but a past to look back fondly upon.

Frazier does not enjoy this luxury. The steel industry and its impact must be integral to her work because they have been integral to her life.

In her study of Qualters's work, art historian and curator Vicky Clarke notes that while Qualters "does frequently include his hometown, he mostly utilizes it as a stage for personal and communal memories, histories, and stories, both real and fictional" (46). The narratives in Qualters's work are arguably a result of his lived experience, of his age, race, gender, and class. Born in 1934, with a school teacher mother and a local politician father, Qualters has been differently affected by broad social, economic, and political dynamics. The destruction and demise of steel mills can take a place in the background because they are not vital to his lived experience. Frazier does not enjoy this luxury. The steel industry and its impact must be integral to her work because they have been integral to her life, as well as the lives of her family and people. The sense of lost vitality in her work is a result of the liveliness that has been slowly drained from her community.

In *The Notion of Family*, Frazier questions whether the narratives of people who are subject to exclusion or strife can be portrayed by people who are other to those realities. Qualters's work is evidence that even those who spend their lives near certain narratives cannot necessarily be inside those narratives. As an African American woman from a working class family, Frazier has authority to speak a narrative that Qualters does not. By chronicling this narrative from within, Frazier demands that attention be paid to her personal family history and to the broader history of African American Braddock.

Frazier questions whether the narratives of people who are subject to exclusion or strife can by portrayed by people who are other to those realities.

Barbara Peacock's work to document life in Westford, Massachusetts, over 33 years in her photobook titled *Hometown* offers a second contrast with Frazier's *The Notion of Family*. Like Frazier, Peacock operates in the broad category of documentary photography that chronicles genealogy and community. However, their aesthetics, techniques, and motives differ markedly. Peacock's work is a charming and somewhat eccentric chronicle of the rituals and characters of her hometown. It was created with the intent of making the ordinary extraordinary, using what was literally available in her own backyard to create works of art.

Peacock's *Parent's Market, 1982* captures the nostalgic mood and quirkiness of her photography. The image features five adolescent white boys outside of a corner store. The saturated

Parent's Market, 1982, from Hometown. Barbara Peacock.

color and warm cast strike a nostalgic mood reminiscent of disposable cameras and older film processing. This mood is reinforced by the familiarity of the objects and brands in the image: a vintage Coca-Cola sign, a US Postal Service mailbox, Budweiser ads, bomber jackets, and corduroy pants, etc.). This could be any small town in America, which is why it resonates with viewers who remember—or want to remember—small town America. As Mel Allen notes in *Yankee Magazine*,

> With a major highway cutting nearby, Westford's population nearly tripled over time, apple orchards became houses, and memories of a quieter time grew even more precious.Yet the resulting compilation of her favorite images from the past 33 years focuses less on what has changed and more on deeper truths—the bonds between people, the annual events that have always connected generations.

Peacock's collection is a documentary, a journey of self-exploration and development as a photographer, intertwined with the happenings of her predominantly white small town. Her images chronicle themes of sadness or loneliness, explore ritual and family, and play on her own memory.

What audiences derive from Frazier's work is quite different from what Peacock's piece communicates. Frazier's work is "an incisive exploration of the legacy of racism and economic decline in America's small towns, as embodied by her hometown of Braddock, Pennsylvania" ("About"). It is a politically charged discourse that offers insight into her own narrative and, more largely, the African American narrative that has been riddled with economic and social ills over the years. While Peacock's skill as a photographer and the merit of her work are not under scrutiny here, her work differs from Frazier's in significant ways. In turn, they should be categorized separately—Frazier's as a hard-hitting, activist chronicle, and Peacock's as a personal depiction of her hometown's memory and history.

For Peacock and Qualters, though, the stakes are low if viewers do not identify with or pay attention to their work. For Frazier, it is imperative that they do.

Peacock and Qualters's works share a relatable quality. Critics tend to agree that audiences can locate themselves within the narratives they present. The familiar landmarks and narratives featured in Qualters's paintings likely resonate with his audience, especially if they have resided in or visited Pittsburgh. For Clarke, it is that Qualters "weaves fact and fiction into compelling stories that reveal human characteristics both universal and individual" (46). Similarly, audiences connect to Peacock's work through its nostalgic, universal evocation of American small towns: "There is enough contextual ambiguity as to the actual location that Peacock's hometown could be representative of any small town in the East or Midwest region of America, which is a factor that draws me and probably other readers into this monograph" (Stockdale). However, relatability is a highly subjective quality that cannot always be counted on to attract the undivided attention of an audience.

No piece of artwork can appeal to every audience. For instance, individuals who have not visited Pittsburgh might not enjoy Qualters's work. Viewers not familiar with small-town American culture might not identify with Peacock's work. For Peacock and Qualters, though, the stakes are low if viewers do not identify with or pay attention to their work. For Frazier, it is imperative that they do, and that they recognize its importance, even if they cannot connect with it. Frazier's work does not represent the lived experience of the majority of her audience, but it does assert that the lived experience she portrays is real and pertinent. Some of her images are alarming, intriguing, or intensely emotional. Some are forlorn, bleak, or unsettling. Her work is penetrating and urgent. She makes herself vulnerable and allows her viewers to see the story she and three generations of her family have lived to bring the importance of this narrative to the forefront of her audience's consciousness. This narrative has been overlooked or intentionally ignored in other art, media, and news, and she demands that audiences pay attention.

Frazier, Qualters, and Peacock weave a sense of identity into their larger narratives of place. Qualters's colorful paintings foreground his own memories against a background of larger societal dynamics in the Pittsburgh area. Peacock's eclectic photographs nostalgically document the ritual and character of her hometown in Massachusetts. And Frazier presents the history of her African American family as intertwined with the larger narrative of the African American community in Braddock, Pennsylvania. She creates a narrative that is both personally and politically relevant, and relays with urgency a story that has been largely ignored by the American public. Her work is compelling and questions the constructs of contemporary documentary photography by speaking history from within a marginalized community. *The Notion of Family* stands apart from other works because it presents an alternative visual narrative that demands viewers' attention. Frazier's work calls for action and opens the stage for other untold or under-told stories.

Author's Note

Madison Schultz ('19) is pursuing a double degree in Media Arts & Design and Social Justice and Photographic Media. She is an avid creator, dabbling in photography, graphic design, reading, writing, and videography. She is passionate about media and the arts and their ability to spur social change.

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El VPH y el cáncer cervical en el Perú

diferencias de accesibilidad entre las mujeres de las zonas rurales y urbanas

HPV and Cervical Cancer in Peru

The Differences in Accessibility for Rural and Urban Women

Jemma Stratton

ABSTRACTO / ABSTRACT

Este informe examina el estado actual del tratamiento y prevención del VPH en el Perú, y pone énfasis con problemas específicas que han contribuido al riesgo alto de cáncer cervical entre las mujeres rurales. Perú ha tomado grandes pasos en las décadas últimas para establecer programas que se dirigen al VPH y la salud de las mujeres. Sin embargo, las mujeres peruanas tienen una población más probable para contraer cáncer cervical en el mundo. Este informe compara los esfuerzos de prevención del VPH entre las poblaciones rurales y urbanas en el Perú y identificar las barreras que causando esta crisis con tres categorías primarias: educación, cultura y accesibilidad. Ofrece recomendaciones sobre cómo se pueden superar los déficits mediante el aumento de la financiación y la revisión de la programación sanitaria.

This report examines the current state of HPV treatment and prevention in Peru, focusing on the specific concerns that have led to an increased risk of cervical cancer among rural women. Peru has gone to great lengths in recent decades to establish programs that target HPV and women's health. However, Peruvian women remain among the populations most at risk for cervical cancer in the world. This report compares HPV prevention efforts between rural and urban populations in Peru and identifies barriers causing the crisis in three main categories: education, culture, and accessibility. It offers recommendations on how deficits can be overcome through increased funding and revised health programming.

EDITORS' NOTE:

JMURJ's mission is to publish the excellent research and scholarship created in *all* JMU undergraduate disciplines. We are therefore delighted to present our first article from JMU's Department of Foreign Languages, Literatures, and Cultures. Jemma Stratton composed her essay in Spanish for her Medical Spanish class and then translated it into English for her *JMURJ* audience. We have opted for a landscape layout to present the paper in both of its languages.

El virus papiloma humano (VPH) es la causa principal de cáncer cervical en el mundo (U.S. Department of Health and Human Services, 2018a). Es a la vez común y discreto, con escasos o nulos síntomas cuando una persona primero contrae la infección. De hecho, el cáncer cervical no es sólo el octavo cáncer más común en todo el mundo, sino el cuarto más común en las mujeres (World Cancer Research Fund, 2018). La mayoría de las muertes que sufren de cáncer cervical estan en países de ingresos bajos y medios (World Health Organization, 2015). Según la Organización Mundial de la Salud (2015), el 85% de las muertes por cáncer cervical en 2012 se encontraban en estos países subdesarrollados. Estas tasas de mortalidad especialmente impactan a América Latina, donde el VPH es dos veces más frecuente que la media global (Nogueira-Rodrigues et al., 2017). En Perú, el cáncer cervical es la principal causa de muerte de mujeres a escala nacional (Bruni et al., 1018). En los últimos años, se han creado muchos programas e iniciativas gubernamentales para mejorar la detección del VPH, y reducir las muertes por cáncer cervical. Sin embargo, las tasas de muerte por cáncer relacionado con el VPH son extraordinariamente altas (Nogueira-Rodrigues et al., 2017). En países como Perú, las barreras que contribuyen a este problema son especialmente complicadas y están fuertemente influidas con las disparidades culturales y diferencias de riqueza.

SOBRE VPH

La primera investigación importante sobre VPH y la conexión con el cáncer cervical ocurrió entre 1976–1987. Durante estos experimentos Harald zur Hausen identificó los tipos de VPH que específicamente causan cáncer. Aunque esto le condujo a ganar el Premio Nóbel de Medicina, todavía quedaba mucho por estudiar sobre el impacto del VPH y el cáncer cervical (Kim, 2017). El VPH en sí mismo es complicado y se ha requerido extensa investigación para entenderlo. Según el Fondo Mundial de investigación sobre el cáncer (2018), la mayoría de las mujeres que contraen el VPH no desarrollan cáncer cervical, aunque la mayoría de los casos de cáncer cervical están relacionados con el virus.

En primer lugar, es importante entender qué es VPH y por qué es una principal causa de cáncer. El VPH es la infección de transmisión sexual más común, con más de mil tipologias diferentes. De estos mil, al menos trece se conocen como "de alto riesgo," lo que significa que pueden causar cáncer. De hecho, dos tipos de VPH, los números 16 y 18, causan el 70% de todos los casos de cáncer cervical (U.S. Department of Health and Human Services, 2018a).

The human papillomavirus (HPV) is the leading cause of cervical cancer in the world (U.S. Department of Health and Human Services, 2018a). It is both common and discrete with little to no symptoms after a person first contracts the infection. Cervical cancer is not only the eighth most common cancer in the world, but it is also the fourth most common among women (World Cancer Research Fund, 2018). The majority of deaths attributed to cervical cancer occur in lower to middle income countries (World Health Organization, 2015). According to the World Health Organization (2015), 85% of cervical cancer deaths in 2012 were from developing countries. These high death rates are especially evident in Latin America, where HPV is two times more prevalent than the global average (Nogueira-Rodrigues et al., 2017). In Peru, cervical cancer is the leading cause of death for women nationwide (Bruni et al., 1018). In recent years, there have been many government programs and initiatives created to improve HPV detection and reduce cervical cancer deaths, yet women continue to die at extraordinary rates from HPV-related cancer (Nogueira-Rodrigues et al., 2017). For countries like Peru, the barriers that contribute to this problem are especially complicated and are closely intertwined with culture and wealth disparities.

ABOUT HPV

The first significant research of the HPV and its connection with cervical cancer occurred from 1976–1987. It was during these experiments that Harald zur Hausen discovered which types of HPV specifically cause cancer. Even though this would lead to him winning the Nobel Peace Prize in Medicine, there was still much to learn about the impact of HPV (Kim, 2017). The virus itself is complicated and has required extensive research to understand. According to the World Cancer Research Fund (2018), most women who contract HPV do not develop cervical cancer, even though most cervical cancers are related to the virus.

First, it is important to understand what HPV is and why it is a principle cause of cervical cancer. HPV is a common sexually transmitted infection, with more than 1,000 existing types. Of these 1,000, at least 13 are known as "high risk," meaning that they can cause cancer. In fact, two types of HPV, numbers 16 and 18, cause 70% of all cases of cervical cancer (U.S. Department of Health and Human Services, 2018a).

El VPH se propaga principalmente a través del actividad sexual; sólo se requiere contacto por la piel (U.S. Department of Health and Human Services, 2018b). El virus se desarrolla lentamente y no se convierte en infeccioso durante las primeras 6–12 semanas después del primer contacto (Stanley, 2008). Por esta razón, el VPH no tiene síntomas y es difícil de detectar.

Además del cáncer cervical, el VPH también puede causar cáncer de ano, vulva, vagina, y pene. Debido a estas graves consecuencias, las pruebas de detección y la educación preventiva son partes importantes para la salud de las mujeres. Las citas periódicas con ginecólogos y las pruebas de Papanicolaou anuales son imprescindibles para prevenir el desarrollo del cáncer cervical (Hahn & Spach, 2018). Según Ault (2006), aunque existen variantes específicas del VPH que causan cáncer, se entiende poco acerca de cómo el sistema inmunológico lucha contra los tipos que son de bajo riesgo.

AMÉRICA LATINA

América Latina tiene una relación complicada con la salud de las mujeres, la educación sexual y el cáncer cervical. Según un informe que investiga los patrones del comportamiento sexual latinoamericano, existe un énfasis por prolongar la pérdida femenina de la virginidad, mientras que se fomenta en el caso de los hombres (Bozon, Gayet, & Barrientos, 2009). Está bien documentado que las tasas de fertilidad han disminuido en el área donde las mujeres tienen niveles educativos más altos, pero no hay datos para indicar patrones similares sobre la pérdida de virginidad masculina (Bozon et al., 2019). Sin embargo, en un estudio por Nelson, Edmonds, Ballesteros, Encalada Soto, and Rodriguez (2014), el factor más importante en cuanto a la cultura latinoamericana y la educación sexual es que la sexualidad no es un tema de conversación directa dentro de las familias o cuando se habla con los profesionales. En el caso de estudio, un padre consideraba las conversaciones sobre sexualidad con sus hijos varones como algo "homosexual o propio de las mujeres," y que por ello no era apropiado hablar del tema (Nelson et al., 2014). De este caso se puede entender que incluso con una educación sexual existen, barreras culturales significativas que determinan la capacidad de los jóvenes para aprender sobre sus cuerpos y, sobre todo, para saber cómo tener una salud sexual adecuada.

América Latina tiene una relación complicada con la salud de las mujeres, la educación sexual y el cáncer cervical.

Latin America has a complicated relationship with women's health, sexual education, and cervical cancer.

HPV primarily spreads through sexual activity, only requiring skin-to-skin contact (U.S. Department of Health and Human Services, 2018b). The virus takes a particularly long time to develop and does not become infectious for 6–12 weeks after initial contact (Stanley, 2008). For this reason, HPV can be symptomless and hard to detect.

In addition to cervical cancer, HPV can also cause cancers of the anus, vulva, vagina, and penis. Due to these serious consequences, screening tests and preventive care are important parts of women's health. Periodic appointments with gynecologists and annual pap smears are essential to prevent cervical cancer development (Hahn & Spach, 2018). According to Ault (2006), although there are specific cancer-causing variants of HPV, little is understood about how the immune system fights off types that are of low risk.

LATIN AMERICA

Latin America has a complicated relationship with women's health, sexual education, and cervical cancer. According to a report investigating patterns of Latin American sexual behavior, there is a definite emphasis on prolonging female sexual debut, while encouraging male development (Bozon, Gayet, & Barrientos, 2009). It is well documented that fertility rates have decreased in areas where women have higher educational levels, but there is no data to indicate a similar patterns existing that connects education to young men's sexual debut (Bozon et al., 2009). However, in a study by Nelson, Edmonds, Ballesteros, Encalada Soto, and Rodriguez (2014), the most important factor regarding Latin American culture and comprehensive sex education is that sexuality is not directly talked about in family conversation or with professionals. In this case study, one father described talking about sexuality as a "gay or woman thing," and that it was not appropriate to talk about (Nelson et al., 2014). From this, it can be understood that even with comprehensive sex education, there are significant cultural barriers that impact the ability for young people to learn about their bodies, and thus know how to properly protect themselves.

Hoy en día, la mayoría de los países en América Latina tienen algún tipo de programa nacional que intenta proporcionar cobertura de salud a los grupos de población menos atendidos, específicamente las mujeres (Gallagher, LaMontagne, & Watson-Jones, 2018). A pesar de ello, no ha habido mejoras significativas en América Latina con respecto al VPH y con respecto a la mortalidad causada por el cáncer cervical. Se han realizado investigaciones sobre cómo desarrollar un programa exitoso, pero todavía hay disparidades abiertas sobre la forma en la que estos programas pueden aplicarse al contexto latinoamericano.

Perú es un país en el que este fenómeno puede ser examinado. El primer intento de programa de prevención del cáncer ginecológico se llevó a cabo en 1998, y el primero enfocado en el cáncer cervical específicamente tuvo lugar en el 2000 (Bukowski, 2016). Cuando el problema se convirtió en una crisis de salud pública, el gobierno peruano lanzó el Plan Esperanza como un intento de aumentar la cantidad de mujeres quienes tenían seguro para cubrir el tratamiento del cáncer (Bukowski, 2016). Sin embargo, pocos programas de los citados abordaron las medidas preventivas y las singulares estructuras geográficas y culturales del Perú. A pesar de los esfuerzos del gobierno, hoy las tasas del VPH y cáncer cervical todavía están en niveles críticamente altos. Es necesario considerar los obstáculos subyacentes que impiden el éxito de los programas nacionales peruanos. Aunque existen barreras similares que afectan a las mujeres peruanas rurales y urbanas, el déficit específico en programas rurales es muy superior. Usando estos programas existentes y la investigación de VPH, resulta evidente que pueden establecerse mejoras o nuevas intervenciones para ayudar a reducir las altas cifras de mortalidad femenina relacionada con el VPH cada año. Además, este conocimiento podría aplicarse a otros países latinoamericanos con condiciones similares.

PERÚ

Durante esta última década, los países latinoamericanos han financiado programas de prevención del VPH. Pero, en Perú, existe una disparidad significativa entre las mujeres urbanas y rurales en estos programas (Nogueira-Rodrigues et al., 2017).

Currently, most countries in Latin America have some form of national program that attempts to provide health coverage to underserved areas, specifically targeting women (Gallagher, LaMontagne, & Watson-Jones, 2018). Despite this, there have been no significant improvements in Latin America regarding HPV and cervical cancer deaths. Research has been conducted on how to develop a successful program, but there are still gaps in how those programs can be applied to the Latin American context.

A country in which this particular phenomenon can be examined is Peru. The first attempt at a program that focused on the prevention of gynecological cancer was in 1998, and one that focused on cervical cancer specifically was created in 2000 (Bukowski, 2016). As the problem grew into a public health crisis, the Peruvian government launched Plan Esperanza as an attempt to increase the number of women who had insurance to cover cancer treatment (Bukowski, 2016). However, few of these programs tackled preventative measures and the unique geographical and cultural structures of Peru. Despite the government's efforts, the rate of HPV and cervical cancer is currently still at critically high levels. It is necessary to consider the underlying obstacles that are holding back Peruvian national programs from prospering. Even though there are similar barriers that affect both rural and urban Peruvian women, there is a specific deficit in programs and initiatives available to those living in rural areas. Using these existing programs and HPV research, it is clear that improvements or new interventions can be established to help lower the staggering amounts of women dying from HPV-related cervical cancer every year. Additionally, this knowledge can thus be applied to other Latin American countries with similar considerations.

A pesar de los esfuerzos del gobierno, hoy las tasas del VPH y cáncer cervical todavía están en niveles críticamente altos.

Despite the government's efforts, the rate of HPV and cervical cancer is currently still at critically high levels.

PERU

In the last decade, Latin American countries have been funding HPV prevention programs, as this relationship has become more understood. However, in Peru, there is a significant disparity between urban and rural women in these implemented programs (Nogueira-Rodrigues et al., 2017).

En 2017, Perú ocupó el primer lugar en la incidencia del cáncer cervical, y el 65.9% de estos casos obtuvieron resultados positivos para las cepas 16 y 18 del VPH (Bruni et al., 2018, p. 33). El gobierno nacional tiene un programa que comenzó en el 2011, además de otros esfuerzos para solucionar este problema (Bruni et al., 2018). Pero, hay dos razones que impiden el éxito de este programa: la falta de recursos disponibles en las zonas rurales, y las barreras ante la aceptación de vacunas (Bukowski, 2016). Estas barreras afectan de manera muy diferente a poblaciones urbanas y rurales, debido a que estos factores están estrechamente entrelazados. Las barreras se desarrollan sobre tres temas: educación, cultura y accesibilidad.

EDUCACIÓN

VACUNAS

Desde un principio la aplicación vacuna contra el VPH ha sido controversial. Las dos vacunas disponibles actualmente son Gardasil y Cervarix. Gardasil protege contra cepas oncogénicas (16, 18) y cepas no oncogénicas que causan verrugas anogenitales (6, 11). Cervarix, sin embargo, es igualmente eficaz, pero sólo puede cubrir las cepas oncogénicas (Stanley, 2008). Según las opiniones de Hopkins y Wood (2013) sobre la toma global de las vacunas contra el VPH, las preocupaciones se deben principalmente a los efectos secundarios, la eficacia, el costo, el riesgo percibido, y la actividad sexual. Todos estos factores están relacionados con la escasez de recursos educativos disponibles para el público global. Sin embargo, este artículo señala que no hay evidencia para apoyar estas preocupaciones, con la excepción del costo financiero. Además, se sabe que una de las preocupaciones para la aplicación de la vacuna es que existe la creencia de que fomenta la promiscuidad sexual, cuando en realidad los niveles de promiscuidad van paralelos a otro factor: la falta de una educación adecuada (Capote Negrin, 2015). Al abordar las preocupaciones sobre el riesgo percibido para las niñas jóvenes, Capote Negrin (2015) también subraya que ellas en un mayor riesgo de infección, debido a la inmadurez inmunológica del epitelio cervical.

No hay una estrategia globalmente estandarizada para describir al público tanto la vacuna como sus efectos (Sherris et al., 2006). El reporte dice que muchos programas y clínicas no aclaran si la vacuna es para el tratamiento de la infección de transmisión sexual o para el cáncer en sí, lo cual confirma las afirmaciones hechas por Sussman et al. (2015). Sussman afirma que la atención médica preventiva no es una prioridad en algunas culturas específicas y en algunos sistemas de salud del mundo, lo cual causa que la toma de vacunas y las pruebas anuales sean particularmente difíciles.

In a 2017 study, among a sample of 249 Peruvian women with cervical cancer, 65.9% of them tested positive for HPV strains 16 and 18 (Bruni et al., 2018, p. 33). The national government started a program in 2011, and there have since been several efforts to solve this problem (Bruni et al., 2018). There are two reasons that the government program is ineffective: the lack of program resources made available to rural areas and the barriers regarding lack of knowledge and acceptances for the vaccine (Bukowski, 2016). The differences between urban and rural populations are impacted greatly by those specific barriers, because the two factors are closely intertwined. The barriers are best described by the three main themes of education, culture, and accessibility.

EDUCATION

VACCINATION

The HPV vaccine has been controversial since its conception. The two vaccines currently available are Gardasil and Cervarix. Gardasil is able to protect against both oncogenic—that is, cancer-causing—strains (16, 18) and non-oncogenic strains that cause anogenital warts (6, 11). Cervarix, however, can only cover the oncogenic strains, although it is equally effective in doing so (Stanley, 2008). According to Hopkins and Wood (2013) on the global uptake of HPV vaccines, concerns are mainly due to side effects, efficacy, cost, perceived risk, and promotion of sexual activity. These factors are all connected to lack of educational resources available to the global public. However, this article states that there is little evidence to validate any of these concerns with the exception of financial cost. Additionally, the vaccine's perceived ability to promote sexual promiscuity is a significant concern in Peru, although evidence suggests that the root of increased sexual activity is lack of proper education (Capote Negrin, 2015). When addressing concerns over perceived risk to young girls, Capote Negrin (2015) also emphasizes that they are at an increased risk to infection due to immunological immaturity of the cervical epithelium.

There is no globally standardized strategy for describing the vaccine and its purpose to the general public (Sherris et al., 2006). The report states that many programs and clinics do not clarify whether the vaccine is for treating an STI or for cancer itself. This correlates with assertions made by Sussman et al. (2015) that preventative health care is not a priority of certain cultures and health systems around the world, making the uptake of vaccines and annual testing particularly difficult.

Existen numerosas consideraciones que se deben tener en cuenta a la hora de construir programas que proporcionen vacunas contra el VPH, principalmente debido a la falta de educación sanitaria y a las malas interpretaciones que existen sobre el virus.

LA FALTA DE INFORMACIÓN

Una barrera específica relacionada con la escasez de educación sanitaria y las tasas altas de VPH es que hay muy poca comprensión sobre la conexión entre el VPH y el cáncer cervical. En un estudio, los investigadores analizaron los niveles de educación sobre salud en mujeres peruanas con bajos ingresos (Lee, Paz-Soldan, Carcamo, & García, 2010). Aunque muchas mujeres eran conscientes de los peligros del cáncer cervical, la mayoría de las entrevistadas no sabían que el VPH aumentaba el riesgo.

Además, esas mismas mujeres ni siquiera sabían que habían vacunas disponibles para protegerse (Lee et al., 2010). En otro estudio, el 30% de las mujeres dijeron que no habían oído hablar sobre el cáncer cervical. Aún más impactante, una mayoría de las mujeres no sabía que existían tratamientos para el cáncer cervical—muchas mujeres creían que la enfermedad era incurable, lo cual explica en parte las altas tasas de mortalidad (Luque, Maupin, Ferris, & Guevara Condorhuaman, 2016). Una vez educadas sobre el VPH y sobre los tratamientos existentes, ellas dijeron que recibirían la vacuna si estuviera disponible. La falta de conocimiento sobre el VPH como una de las causas principales del cáncer cervical crea un peligroso ciclo, porque las mujeres no reciben la ayuda antes de que la infección llegue a un estado crítico.

En otro estudio, el 30% de las mujeres dijeron que no habían oído hablar sobre el cáncer cervical.

In another study, 30% of women said they had not heard of cervical cancer.

CULTURA

La cultura de la atención médica en Perú tiene un impacto significativo en la forma en que se trata el VPH. En Perú, medicina preventiva es un cuestión de accesibilidad y capacidad tecnología. Según un estudio, es muy común que las mujeres esperen hasta que los síntomas se hagan severos antes de buscar atención médica (Luque et al., 2016). Por esta razón, y por el desconocimiento sobre la relación entre el VPH y el cáncer cervical, se crea un peligroso ciclo de salud donde las mujeres no buscan asistencia médica antes de que la infección llegue a un estado crítico. La medicina preventiva- incluye la aplicación anual del Papanicolaou y citas regulares con el ginecólogo.

It is clear that there are numerous considerations to take into account when building programs that provide HPV vaccines, mostly due to a lack of health education and misinterpretations of the virus.

LACK OF INFORMATION

A specific barrier related to the shortage of health education and high rates of HPV is that there is little understanding of the connection between HPV rates and cervical cancer. In one study, the researchers analyzed levels of health education for low-income Peruvian women (Lee, Paz-Soldan, Carcamo, & García, 2010). Although many women were aware of the dangers of cervical cancer, the majority who were interviewed did not know HPV increased risk.

Additionally, those same women did not even know there were vaccines available to protect themselves (Lee et al., 2010). In another study, 30% of women said they had not heard of cervical cancer. Even more shocking, a majority of women did not know that there were treatments for cervical cancer—many believed the disease was incurable, which was why so many women died (Luque, Maupin, Ferris, & Guevara Condorhuaman, 2016). Once educated about HPV and what treatments did exist, they reported that they would receive the vaccine if it were made available to them. This lack of understanding that HPV is a leading cause of cervical cancer creates a dangerous health cycle where women do not reach out for help before the condition reaches a critical state.

CULTURE

The culture surrounding health care in Peru has significant impacts on the way HPV is treated. In Peru, preventative medicine is a question of accessibility as well as technological capability. According to one study, it was very common for women to wait until symptoms became severe before seeking medical care (Luque et al., 2016). This is due to the cultural norm that doctor intervention is only needed as a last resort. In regards to HPV and cervical cancer, preventive medicine includes annual pap smears and regular appointments with a gynecologist.

MACHISMO

El concepto de machismo limita severamente la aceptación de las vacunas y el tratamiento del VPH en Perú. El machismo es la práctica ampliamente observada del dominio masculino en los países latinoamericanos. Se define como una "actitud de prepotencia de los varones respecto de las mujeres." ("Machismo," 2014). El machismo provoca una dinámica familiar donde el hombre tiene un poder intrínseco, mientras las mujeres permanecen en roles tradicionales, como la sumisión a sus cónyuges. En un estudio de la aceptación de la vacuna contra el VPH entre los padres en Perú, se entrevistó a las familias sobre el conocimiento de la salud de las mujeres (específicamente sobre el cáncer cervical y las infecciones por VPH), y luego se les ofrecieron vacunas gratuitas a través de un programa escolar (Bartolini, Winkler, Penny, & LaMontagne, 2012). Las familias que rechazaron la vacuna para sus hijas eran familias fuertemente influidas por conductas machistas. Por ejemplo, durante el estudio muchas mujeres miraron a sus esposos para antes de decidir si la hija podría ser vacunada contra el VPH o no. Dado que los padres varones tenían menos probabilidades de tener información sobre el cáncer cervical, muchas familias dijeron que no (Bartolini et al., 2012). Esto se debió en gran parte a los mitos comunes de que la vacuna contra el VPH puede causar esterilidad o promover la promiscuidad. Muchos citaron que su decisión de rechazar la vacuna fue tomada por estas dos razones, lo cual es un mito común.

Sin embargo, este estudio sostiene que proporcionar vacunas a través de las escuelas locales es una manera eficaz de luchar contra los malentendidos culturales. Los maestros son respetadas figuras de autoridad, especialmente en las zonas rurales, por lo que muchos padres confían en su opinión respecto a las vacunas (Bartolini et al., 2012). Además, cuando las escuelas las proporcionan, las vacunas son típicamente gratis—lo cual elimina también potenciales barreras financieras.

PERCEPCIÓN PÚBLICA

Culturalmente, las vacunas y la medicina tienen una connotación positiva en ámbitos rurales y urbanos. Debido a las altas cantidades de muertes por cáncer cervical, muchas mujeres peruanas son conscientes de la gravedad de la enfermedad, incluso si no están familiarizadas con conocimientos científicos (Bartolini et al., 2012). No es sorprendente que este aumento del miedo al cáncer cervical haya propiciado una mayor aceptación de métodos para reducir el riesgo. Sin embargo, esta percepción sólo es válida en las comunidades urbanas. En particular, las comunidades quechuas suelen quedarse fuera. Las mujeres quechuas viven en zonas rurales, y tienen sus propias creencias tradicionales sobre la medicina y la salud, conocidas como prácticas etno-

MACHISMO

The concept of machismo severely limits vaccine acceptability and HPV treatment in Peru. Machismo is the widely observed practice of male dominance in Latin American countries. It is defined as "the attitude men are prepotent towards women" ("Machismo," 2014). Machismo creates a family dynamic where men have more intrinsic power, and women remain in traditional roles, which include being submissive to their spouses. In a study on the acceptance of the HPV vaccine among parents in Peru, the families were interviewed to determine their knowledge about women's health (specifically regarding cervical cancer and HPV infections), and then were offered free vaccines through a school program (Bartolini, Winkler, Penny, & LaMontagne, 2012). Families who refused to allow their daughters to be vaccinated were typically strongly influenced by machismo. For example, many women in the study looked to their husbands to make the decision about whether to allow their daughter to receive the HPV vaccine or not. Since fathers were less likely to have knowledge or understanding about cervical cancer, they said no (Bartolini et al., 2012). Many cited that their decision was made due to the beliefs that the vaccine can cause sterilization and promote promiscuity, which are common myths.

This study did, however, find that providing vaccines through local schools is an effective way to fight against cultural misconceptions. Teachers are highly respected figures of authority, and many parents rely on their judgment. (Bartolini et al., 2012). In addition, when provided through schools, vaccines are typically free—eliminating any potential financial barriers as well.

PUBLIC PERCEPTION

Culturally, vaccines and medicine generally have a positive connotation in Peru. Due to the high numbers of deaths from cervical cancer, many Peruvian women are aware of the seriousness of the condition, even if they are unfamiliar with the science behind it (Bartolini et al., 2012). It is not surprising that the increased fear of cervical cancer is proportionate to more acceptance of methods that reduce the risk. However, this sentiment does not translate to all Peruvian women and families, and only holds true in urban communities. Specifically, Quechua-speaking people are often not considered in the discussion. The main reason for this is that Quechua women live in more rural areas and also have their own traditional beliefs about medicine and health, known as ethnomedical practices (Luque et al., 2016).

médicas (Luque et al., 2016). Además, son escasos los proveedores de atención médica que pueden hablar quechua para educar a estas mujeres de una forma que puedan entenderlos.

CREENCIAS INDÍGENAS

Los quechuas son un grupo indígena Sudamericano que vive en los Andes, en Perú, Colombia, Chile, Bolivia y el norte de Argentina (Casma, 2014; Latin American and Caribbean Studies Institute, 2015). Existe una larga historia de discriminación y dominación de esta población, y muchos permanecen al margen del desarrollo visto en zonas urbanas. En Perú, entre las personas sin acceso a la atención médica, el 60% habla quechua (Casma, 2014). Una razón de esta disparidad es que el quechua no es una lengua escrita según a convenciones occidentales. Por lo tanto, no se pueden proporcionar materiales educativos escritos, y existe una fuerte dependencia en la capacidad de los profesionales para hablarlo (Ferris, Hupman, Waller, Cudnik, & Watkins, 2009). Este es un aspecto cultural que rara vez se toma en consideración cuando se trata de proporcionar la educación contra el VPH y el cáncer cervical a las mujeres rurales. Según un programa educacional lanzado en el 2014, las mujeres indígenas tienen una tasa de mortalidad para el cáncer cervical cinco veces mayor que las mujeres no indígenas (Global Health, 2017).

No es sorprendente que este aumento del miedo al cáncer cervical haya propiciado una mayor aceptación de métodos para reducir el riesgo.

It is not surprising that the increased fear of cervical cancer is proportionate to more acceptance of methods that reduce the risk.

El uso de una perspectiva antropológica médica como marco para analizar la situación única de las mujeres indígenas peruanas se puede explicar por consideraciones culturales. En un estudio del etnógrafo Shephard (2002), sanar y curar son dos conceptos diferentes dentro de los tratamientos médicos. Curar es el proceso que un equipo médico toma para tratar la enfermedad de una persona de una enfermedad. Por el contrario, sanar es el proceso según el cual el paciente percibe que se ha curado de la enfermedad. El estudio explica la experiencia de una mujer peruana con cáncer de ovario que no percibe el tratamiento médico occidental como un método para curarla, incluso cuando este tratamiento pudiera posiblemente curarla del cáncer. Según su cultura indígena, el cáncer es un demonio que ha infestado su alma, y requiere un ritual espiritual. Aunque el ritual no cura el cáncer, le da la paz mental experimentada a través del sanación (Shephard, 2002).

In addition, few healthcare providers can speak Quechua to educate these women in a way they can understand.

INDIGENOUS BELIEFS

The Quechua are the indigenous people of the Andean mountain region, as well as parts of southern Colombia, Chile, and northern Argentina (Casma, 2014; Latin American and Caribbean Studies Institute, 2015). There is a long history of discrimination and oppression of this population, and many remain extremely isolated from urban life. In Peru, among the people who have no access to healthcare, 60% speak Quechua (Casma, 2014). One reason for this disparity is that Quechua is not a written language according to Western conventions. Therefore, written educational materials cannot be provided, and there is a heavy reliance on professionals' ability to speak it (Ferris, Hupman, Waller, Cudnik, & Watkins, 2009). This is a cultural aspect that is seldom taken into consideration when it comes to providing HPV education and cervical cancer to rural women. According to an educational program launched in 2014, indigenous women have a mortality rate for cervical cancer that is five times higher than non-indigenous women (Global Health, 2017).

Using a medical anthropological perspective as a framework to analyze the unique situation of indigenous Peruvian women is beneficial to explain cultural considerations. In an ethnography by Shepard (2002), healing and curing are defined as two different concepts in relation to medical treatment. Curing is the process a medical team takes to rid a person from a disease or illness. In contrast, healing is what it takes for the patient to perceive their illness as gone. The ethnography details the experience of a Peruvian woman with ovarian cancer who does not perceive western medical treatment as a way to heal her—even if that treatment might possibly remove the cancer. In her indigenous culture, her cancer was a demon infesting her soul, which required a spiritual ritual. Although the ritual did not cure her cancer, it gave her the peace of mind that she had been healed (Shepard, 2002).

Por supuesto, las principales preocupaciones de salud como el VPH y el cáncer cervical todavía deben tratarse en estas poblaciones, pero la forma en que se hace debe ser culturalmente sensible y apropiada.

ACCESIBILIDAD

Las mujeres rurales encuentran también el problema de las limitadas facilidades de salud, lo cual contribuye aún más a la falta de tratamiento para el VPH y el cáncer cervical. En primer lugar, el almacenamiento y el transporte de las vacunas es un componente crucial en su distribución. Las vacunas deben refrigerarse durante el transporte y en las facilidades en las que se almacenen. Este proceso de almacenar y transportar la medicina a la temperatura apropiada se lleva a cabo a través del uso de cadenas frías (PATH & Nutrition Research Institute, 2009). Las cadenas frías existen en Perú, pero sólo en las zonas urbanas o en las zonas rurales de fácil acceso (por ejemplo, a una distancia relativamente cercana de una ciudad). Sin embargo, según la investigación, pocos centros de salud en las zonas rurales, especialmente en la región de los Andes, tienen equipos de refrigeración. Proporcionar este equipo puede ser difícil porque estas áreas típicamente no tienen suficientes fuentes de energía, y las instalaciones no tienen la capacidad eléctrica necesaria (PATH & Nutrition Research Institute, 2009). Sin la infraestructura apropiada, las poblaciones rurales no pueden acceder fácilmente a las vacunas contra el VPH. Esto causa un problema crítico en la atención a estas mujeres, e impacta de manera determinante a su salud futuro.

Hay una complicación adicional relacionada con la infraestructura por la cual las mujeres reciben sus vacunas. Con el fin de ser más efectiva, la vacuna contra el VPH debe administrarse en tres dosis. Sin embargo, en las zonas rurales no existe un método establecido de seguimiento de las mujeres que han comenzado a recibir la vacuna (PATH & Nutrition Research Institute, 2009). Aunque algunas mujeres reciben con éxito la primera dosis, es posible que no lleguen a recibir las otras dos y, por lo tanto, no están completamente protegidas. Además, el personal médico de las zonas rurales no siempre está adecuadamente capacitado, lo que puede hacer que el gobierno peruano se resista a establecer programas allí. Por ejemplo, un problema en la educación médica es cómo deshacerse adecuadamente de las agujas de la vacuna y los desechos (PATH & Nutrition Research Institute, 2009). Para algunas instalaciones aisladas, estos procedimientos pueden ser difíciles de ejecutar porque las áreas de eliminación adecuadas están a kilómetros de distancia.

Of course, major health concerns like HPV and cervical cancer should still be addressed in these populations, but the way it is done should be culturally sensitive and appropriate.

ACCESSIBILITY

Rural women are also struggling with the issue of limited health facilities, which only further contributes to the lack of treatment availability for HPV and cervical cancer. First, the storage and transport of the physical vaccines is a crucial component of distribution. The vaccines must be refrigerated during transport and in the facilities in which they are stored. This process of storing and transporting the medicine at the appropriate temperature is through the use of cold chains (PATH & Nutrition Research Institute, 2009). Cold chains exist in Peru, but are only in urban areas or the rural areas that are easily accessed (i.e., at a distance relatively close to a city). However, according to the research, few health centers in rural areas, especially in the Andean region, have refrigeration equipment. Providing this equipment can be difficult because these areas typically do not have sufficient energy sources, and the facilities do not have the electrical capacity (PATH & Nutrition Research Institute, 2009). Without the appropriate infrastructure, rural populations cannot easily access HPV vaccines. This inherently causes a critical gap in coverage among these women, and it is a significant determinant for their future health outcomes.

There is an additional complication related to infrastructure in terms of the process in which rural women receive their vaccines. In order to be most effective, the HPV vaccine should be administered in three doses. However, in rural areas, there is no established method of tracking women who have begun receiving the vaccine (PATH & Nutrition Research Institute, 2009). Even though some women successfully receive the first dose, it is possible that they are not receiving the other two doses, and therefore, they are not completely protected. Additionally, medical personnel in rural areas are not always adequately trained, which can make the Peruvian government reluctant to establish programs there. For example, one gap in medical education is how to properly dispose of vaccine needles and waste (PATH & Nutrition Research Institute, 2009). For some isolated facilities, those procedures can be difficult to execute because the proper disposal areas are miles away.

RECOMENDACIONES

En un reporte por Bukowski (2016), se afirmó que los programas de prevención deberían tener dos funciones: prevención primaria y prevención secundaria. La prevención primaria incluye la vacunación contra VPH, y los factores que garantizan una implementación exitosa son la cobertura, el costo, el tipo de población, la dosis, la administración y el monitoreo. La prevención secundaria se refiere a las formas de exploración y a los exámenes que conducen a una detección precoz del VPH. La exploración puede ser a través del papanicolau, de pruebas de ADN, o de inspección visual (Bukowski, 2016). Otra consideración importante es que haya una estipulación dentro de la comunidad médica acerca de la frecuencia con la se deben realizar las pruebas de detección. Anteriormente, se había establecido que los pananicolaus debían realizarse anualmente, pero en otro informe se recomienda que se lleven a cabo cada tres años a partir de las edades 21–29 (Hahn & Spach, 2018).

En países como el Perú se debe tener en cuenta la competencia cultural en cualquier programa nuevo que pretenda aumentar la conciencia sobre el VPH y el cáncer cervical. Además, las soluciones requieren la coordinación entre las comunidades locales, los programas desarrollados y los funcionarios gubernamentales. Como se indicó en investigaciones anteriores, las escuelas son lugares excelentes para la distribución de vacunas porque son culturalmente respetadas y disponibles para muchos. Aunque esta situación es complicada, hay algunas soluciones que pueden ayudar a combatir estas barreras. Fundamentalmente, la competencia cultural tiene que estar en el centro de cualquier programa nuevo para aumentar la conciencia sobre el VPH y el cáncer cervical. Además, cualquier solución requerirá de coordinación entre las comunidades locales, los promotores de programas y el gobierno. Con la cooperación de los programas gubernamentales y estas áreas locales, a las mujeres rurales se les puede dar un mejor servicio en Perú. Debido a las disparidades entre las causas de los efectos del VPH en mujeres, el gobierno debe centrarse en establecer una infraestructura que apoye las cadenas frías y aumente el financiamiento para estas áreas. Es necesario que en los programas nuevos participen profesionales que pueden hablar quechua y que estén familiarizados con la cultura quechua. Sólo así la salud de la población indígena estará a la altura de la salud entre las mujeres de las zonas urbanas.

Con la combinación de los programas gubernamentales y estas áreas locales, a las mujeres rurales se les puede dar un mejor servicio en Perú

With the combination of the government programs and these local areas, rural women can receive better services in Peru.

RECOMMENDATIONS

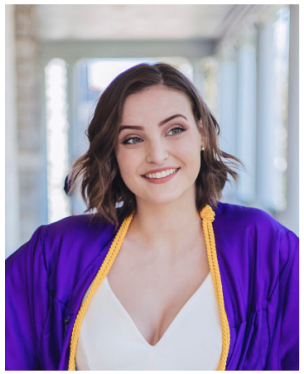
In a report by Bukowski (2016), it was asserted that prevention programs should have two functions: primary prevention and secondary prevention. Primary prevention includes HPV vaccination, and the factors that must be considered in order for this phase to be successful are coverage, cost, target population, dose, administration, and monitoring. Secondary prevention is for all forms of screening and tests that lead to early detection of HPV. Screening can be either through procedures like pap smears, DNA testing, or visual inspection (Bukowski, 2016). Another important consideration is that there is discourse within the medical community about how often screening tests should be done. Previously, it had been established that pap smears should be conducted annually, but in one report, it is recommended that they should occur every three years from ages 21–29 (Hahn & Spach, 2018).

For countries like Peru, cultural competency has to be at the center of any new program in order to increase HPV and cervical cancer awareness. Moreover, solutions require coordination between the local communities, developed programs, and government officials. As stated previously, the schools are excellent places for the distribution of vaccines because they are culturally respected and accessible to many. Although this situation is complicated, there are various solutions that can combat these barriers. Essentially, cultural competency has to be at the center of any new program in order to increase HPV and cervical cancer awareness. Additionally, any solution could require coordination between local communities, the development of programs, and the government. With the combination of the government programs and these local areas, rural women can receive better services in Peru. Due to the stark disparities that cause rural women to be vulnerable to HPV, the government should focus on establishing infrastructure that supports cold chains and increases funding for these areas. Additionally, it is imperative that any new programs have professionals who can not only speak Quechua but are also familiar with their cultural norms. These steps might be allowing for indigenous women's health to be prioritized the same way urban women's health is.

Evidentemente, será difícil implementar las soluciones para aumentar la educación y la aceptación de la vacuna contra el VPH, con el fin de reducir las muertes por cáncer cervical. Requerirá una gran cantidad de coordinación y la evolución en las distintas percepciones culturales puede durar muchos años. Sin embargo, algún tipo de acción se necesita, dada la magnitud del problema sanitario, tanto a nivel de los servicios de prevención como en las altas tasas de mortalidad femenina. El reconocimiento de estas barreras y la búsqueda de las formas para solucionarlos contribuirán a disminuir las diferencias entre áreas rurales y áreas urbanas, permitiendo con ello mejoras futuras en la salud femenina.

Understandably, the solutions that increase education and acceptance for the HPV vaccine, and therefore reduce cervical cancer deaths, will be complicated to implement. It will require a great amount of coordination, and the evolution of cultural awareness perception will take many years. However, there must be action due to the severity of the problem in Peru. Not only do women die of HPV-related cervical cancer, but many are also not offered the services needed to protect themselves. The knowledge of these barriers and search for ways to solve them will close the gap between rural and urban areas, allowing the Peruvian female population to have better health outcomes in future years.

Author's Note



Jemma Stratton ('19) graduated with a major in Social Work and a double minor in Medical Spanish and Family Studies. She backpacked through Peru this past summer on an educational course to learn about maternal and child health in indigenous communities. She is currently attending the University of Washington in Seattle for her Masters in Social Work with a Health Care concentration. Jemma hopes to work as a perinatal social worker and to continue learning Spanish until she reaches fluency.

The *JMURJ* Editorial Board would like to thank Dr. Tomás Regalado-López in Foreign Languages, Literatures, and Cultures and Dr. Vanessa Rouillon in Writing, Rhetoric and Technical Communication for their help in preparing Ms. Stratton's work for publication.

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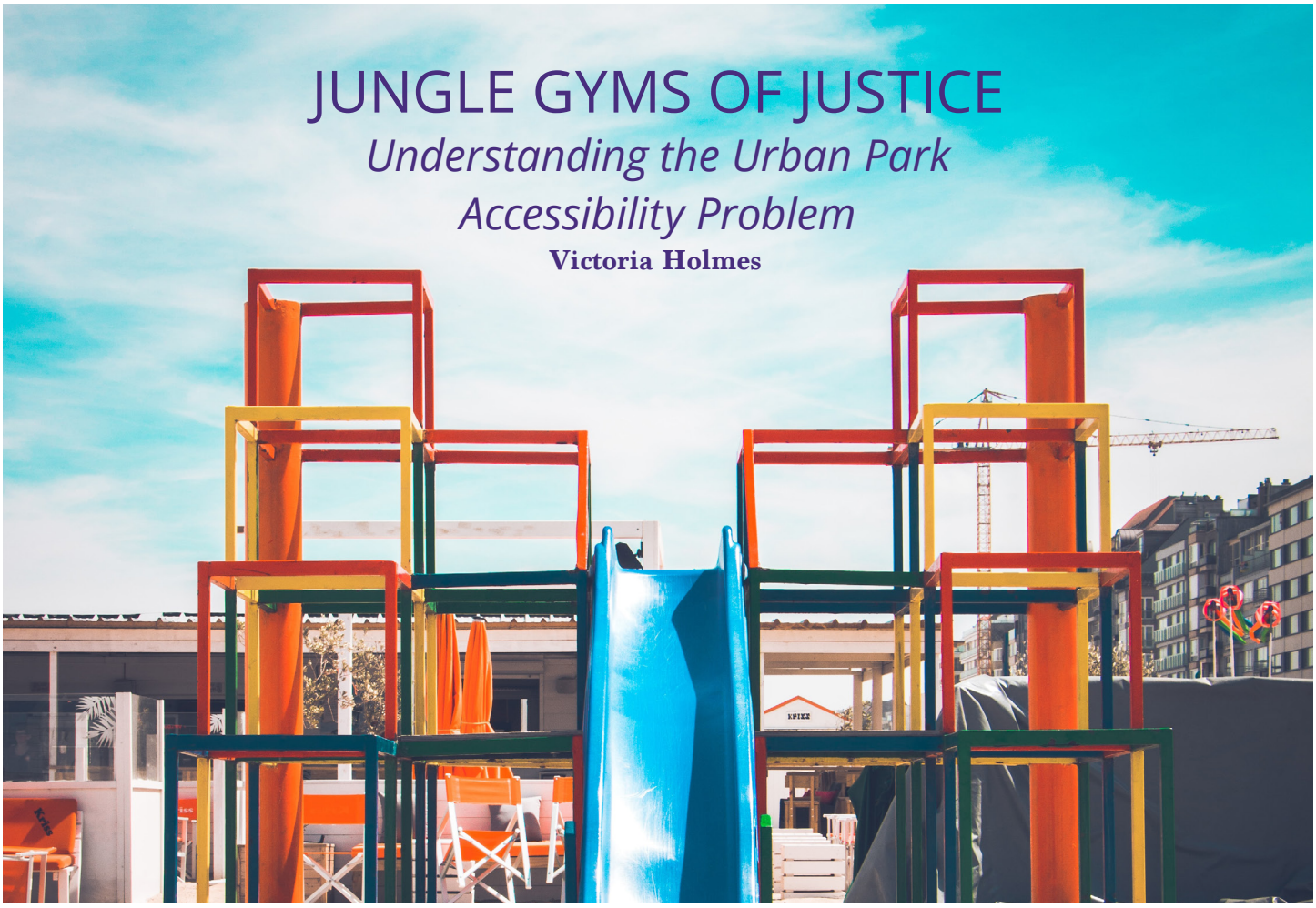

JUNGLE GYMS OF JUSTICE

Understanding the Urban Park Accessibility Problem

Victoria Holmes

ABSTRACT

Urban parks and green spaces have the potential to provide outstanding benefits to both children and adults. However, increased urbanization and the disproportionate placement of urban parks and green spaces can make these benefits elusive. Case studies focused on Los Angeles, Denver, and Chicago have found that access to urban parks and green spaces is more challenging for non-white and low-socioeconomic status populations. The present study, focused on the much smaller, much less populated city of Harrisonburg, Virginia, builds on this work using geographic information system (GIS) buffer analysis to find that all socioeconomic groups face access issues to some degree. To address the problem, the study proposes increased efficiency of public transportation and increased environmental education through school gardening programs.

Since at least the mid-1970s, psychologists, social ecologists, environmentalists, and park officials have worried that children "are being denied the opportunity to explore wild places and to learn about nature" (Mergen, 2003, p. 645). In 2010, nearly 84% of the United States population lived in a metropolitan area (Short, 2012), and only 39% of the U.S. population lived within a half-mile of a park (Ussery et al., 2016). Researchers have examined the relationship between individuals of low-socioeconomic status and accessibility to public parks and urban green spaces in major U.S. cities. Case studies by Wolch, Wilson, and Fehrenbach (2005); Rigolon and Flohr (2014); and Tinsley, Tinsley, and Crosskeys (2002) suggest that public parks and urban green spaces are disproportionately inaccessible to low-socioeconomic groups, with marginalized communities not able to access the public benefits that parks and green spaces afford. These researchers' concerns and methods inform the current study in Harrisonburg, Virginia, where all socioeconomic groups face access issues to some degree. The current study identifies policy recommendations to address this issue.

Literature Review

The goal of urban park planners in the 1970s was to provide socioeconomically disadvantaged communities in the United States with areas to experience nature and recreation (Byrne, Wolch, & Zhang, 2009, p. 366). The emphasis on providing parks and green spaces to disadvantaged communities has continued since then, as these communities continue to face "disproportionately poor access to urban open space" (Byrne et al., 2009, p. 365).

Researchers working in a variety of fields have found that urban parks and green spaces can provide a range of benefits to communities (as cited in Tempesta, 2015, pp. 130-131). Parks and green spaces absorb heat and regulate temperatures, potentially reducing summer air conditioning costs (Nowak & Dwyer, 2007). Other benefits include absorption and removal of air pollutants and emissions, conservation of energy, and prevention of further emissions from power plants (Nowak & Dwyer, 2007). Harnik and Welle (2009) have also found that urban parks and green spaces provide measurable economic benefits, such as profits from tourism and increased property value from park proximity.

At a more personal level, urban parks and green spaces allow individuals to enjoy aesthetic landscapes, interact with one another, and have emotional and physical experiences (Tempesta, 2015). Park trails and play amenities provide a space with physical activities for both adults and children. When individuals live within proximity to an urban park or green space, they can engage in physical activities more frequently. These physical activities can prevent obesity-related diseases and premature deaths (Byrne et al., 2009). Green spaces and school gardening programs allow children to grow their own food. These programs may influence children to eat more vegetables and take an active role in planting and growing produce (Blair, 2009).

Individuals who do not live within walking distance—approximately half a mile—of a park or green space cannot easily access these amenities (Ussery et al., 2016). The U.S. Surgeon General's "Call to Action to Promote Walking and Walkable Communities" stated that distance often discourages individuals from walking (U.S. Department of Health and Human Services, 2015). In 2010, only 39% of the total U.S. population lived within a half-mile of a park. The 61% of U.S. citizens who do not live within access to an urban park or green space is often composed of groups of low-socioeconomic status (Ussery et al., 2016). It appears that the most common park visitor is a middle-aged, college-educated Caucasian male who lives nearby (Ussery et al., 2016).

Los Angeles

In "Places to Play: Environmental Justice and the Distribution of Urban Parks and Recreation in Los Angeles," Wolch et al. (2005) aimed to understand the dynamics of environmental injustice and racism in the Los Angeles community. Their case study found that history played a large role in environmental injustices directed at low-income and minority communities. Historically, urban parks were supposed to be places that not only represented nature but created a better society by establishing "better public health, social prosperity, social coherence, and democratic equality" (Wolch et al., 2005, p. 7). Wolch et al. cited these concerns as the reasons for new land acquisition and facility construction within the growing metropolitan area. However, as industrialization grew within Los Angeles, the demand for low-wage workers, often people of color, also increased. Wolch et al. show that Los Angeles planners deliberately built low-wage housing near industrial facilities for minority workers.

Public policy has also played a role in shaping these inequalities in Los Angeles. The Los Angeles zoning code of 1904 allowed commercial and industrial activities to be located near high-density housing on the city's eastern and southern borders where low-income workers often lived. This policy protected predominantly Caucasian, Westside residents from exposure to industry (Wolch et al., 2005). In addition to exposure to hazardous waste sites, low-income communities also dealt with environmental racism that resulted in "park-poor neighborhoods" (Wolch et al., 2005, p. 8). Wolch et al. (2005) identified park-poor neighborhoods as a major issue in the Los Angeles community because

children in high-density and low-income communities tended to utilize park resources more frequently and intensively compared to children in suburban areas.

RESEARCH METHODS. Wolch, Wilson, and Fehrenbach (2005) began their research by defining communities according to their ethnic identity and then considered local access to park space. They employed a "park service area" approach which assumed that every resident utilized the nearest park at a consistent rate. Residents in each neighborhood were then assigned to their closest park. Wolch wrote in 2012 about the 2005 study that the National Recreation and Parks Association "historically recommended 6–10 park acres per 1,000 residents." Recent data shows that the median acres of park land per 1,000 residents is 10.1 acres, with the lowest quartile of Americans able to access only 5.2 acres of park land per 1,000 residents (National Recreation and Parks Association, 2019).

FINDINGS. Wolch et al. (2005) found that predominantly Latino and Asian-Pacific Islander neighborhoods had the highest population densities, with predominantly African American neighborhoods following closely. The densities in these neighborhoods were two to five times higher than in predominantly Caucasian neighborhoods. The Latino population had 0.6 park acres per 1,000 residents, the African American population had 1.7 park acres per 1,000 residents, and the Caucasian population had 31.8 park acres per 1,000 residents. Out of the 1,674 park service areas, only 24% experienced a park pressure within the recommended standard of 6–10 park acres per 1,000 residents, while 76% sustained a park pressure higher than the recommended standard. The study found that the 24% of park service that were areas within the recommended range contained larger green spaces, while the rest had smaller parks, a higher number of visitors, and were located in the central Los Angeles basin.

Denver

"Access to Parks for Youth as an Environmental Justice Issue" by Alessandro Rigolon and Travis Flohr (2014) is valuable for its broad definitions of play spaces, detailed accessibility assessment, and strategies for reaching their conclusion. The work sought to examine the relationship between the proximity of green play spaces to different ethnic groups and classes in Denver, Colorado. Denver had few parks in low-income neighborhoods, and advocates have exhibited concern for children's physical health due to these circumstances. However, it was apparent that not every play space had the same benefits on a child's mental and physical health (Rigolon & Flohr, 2014).

RESEARCH METHODS. For research purposes, Denver was divided into 78 different neighborhoods based on density, distance from downtown, and income level (Rigolon & Flohr, 2014). In order to achieve a comprehensive understanding of which park amenities were present in park areas, the parks were classified according to formal play spaces, informal play spaces, and levels of intimacy. Rigolon and Flohr (2014) defined formal play spaces as areas such as playgrounds, pools, skate parks, and sports fields where children could engage in activities. Informal play spaces featured natural elements such as sand, water, trees, and rocks that help children develop an intimate relationship with nature. Levels of intimacy referred to the degree to which play areas provide a sense of enclosure in nature, often surrounded by vegetation or rocks. Rigolon and Flohr state children prefer areas with higher levels of intimacy because they give them a place of refuge and a sense of privacy from adults. Each Denver park was then evaluated on its accessibility. Rigolon and Flohr (2014) created a "walkability index" using the speed limit, tree canopies that provide shade, and sidewalks to calculate whether a park was in safe walking distance from a child's home.

FINDINGS. Rigolon and Flohr's (2014) results provided evidence of environmental injustices. Their statistics revealed that parks with a better and wider range of play amenities (formal, informal, and levels of intimacy) were located near predominantly Caucasian neighborhoods with higher income levels. According to the walkability index, low-income neighborhoods had the lowest access to parks, and high-income neighborhoods had the highest access.

Chicago

"Park Usage, Social Milieu, and Psychological Benefits of Park Use Reported by Older Urban Park Users from Four Ethnic Groups" by Tinsley et al. (2002) focused on the park experiences of African, Hispanic, Asian, and Caucasian groups in Lincoln Park in Chicago, Illinois. The case study identified racial differences in access and their role in park usage for long-term residents of a specific area.

RESEARCH METHODS. Interviewers requested information about the participants' visits to Lincoln Park. The 437 interviews were conducted at different times of day, in different areas of the park, and on all seven days of the week to ensure a random sample of respondents. The average participant had lived in Chicago for 20 years or more, which made them knowledgeable about the location, transportation methods, facilities and programs, and different festivals or special events that the park hosted.

FINDINGS. The study found that the mean travel time was 24.3 minutes for African American park users, 24.1 for Hispanic American users, 22.6 for Asian American users, and 18.2 for Caucasian users. The research further showed that 29% of Caucasians had driven to the park while the majority of

of people of African (52%), Hispanic (50%), and Asian (58%) descent drove. These results were supplemented by bus statistics showing that 14% to 18% of people of Asian, Hispanic, and African descent had taken a bus to the park, while only 3% of Caucasians had done so. These statistics demonstrate that accessibility may be less of a barrier for Caucasians in comparison to the other groups.

Tinsley et al. (2002) also found the Caucasian group visited the park more frequently than any of the other groups. Caucasian respondents reported visiting the park more than once a week but less than three to four times a week. The Asian American respondents used the park once a week to once a month on average. Lastly, the Hispanic and African American respondents used the park on average once a month. The study also showed that visitors who visited the park on both weekdays and weekends accrued more benefits than those who just visited once a week or month. Finally, because the Hispanic and Asian American communities had to travel farther to get to Lincoln Park, they were more likely to visit their neighborhood park rather than utilize Lincoln Park's extensive amenities.

Environmental Justice

Together, the three case studies illustrated that Caucasian communities were the majority ethnic group of park visitors in large metropolitan cities. More frequent park access can be attributed to factors such as more parks per 1,000 residents (Wolch et al., 2005), closer proximity to parks and play spaces (Rigolon & Flohr, 2014; Tinsley et al., 2002), and a wider range of available play amenities (Rigolon & Flohr, 2014).

Even if someone lives within walking distance to a park, Rigolon and Flohr (2014) demonstrated that other barriers such as roads, presence of sidewalks, shade, transportation, and local traffic can prevent park access. Therefore, further considerations have to be taken by park visitors (especially parents of young children). These considerations can make planning a trip to a park more challenging, and therefore make the park less accessible.

The U.S. Environmental Protection Agency (2018) defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." Communities that do not have access to the benefits of urban parks and green spaces are not fairly treated and involved when park development plans are being implemented. Distance is a barrier, and communities that are not within walking distance to parks are subject to an environmental justice issue (Holifield, 2001).

GIS and Park Proximity in Harrisonburg, VA

After researching the issue of park proximity in larger cities (Los Angeles, Denver, and Chicago), I wanted to conduct my own environmental justice study. As of July 2017, Harrisonburg had a population of approximately 54,215 individuals (U.S. Census Bureau, 2018), which is significantly smaller than the other analyzed cities. Having affirmed that Los Angeles, Denver, and Chicago all suffer from uneven access to urban parks and green spaces, I wanted to see if this was the case for smaller cities. I chose my current city of residence, Harrisonburg, Virginia, to complete this study.

Research Methods

I completed my analyses using ArcGIS Desktop "Analysis Tools." I chose to use a Multi-Ring Buffer in order to show the 0.25-mile and the 0.5-mile radius surrounding each park in Harrisonburg. This analysis demonstrated what residential communities were within and outside of the 0.25- and 0.5-mile buffers. Figure 1 shows the breakdown of residential areas in Harrisonburg. I then focused on those that were outside of the multi-ring buffer and determined what type of residential community they were using Zoning Information provided by the City of Harrisonburg (FIgure 2). Lastly, I used ArcGIS Desktop to calculate the percentage of Harrisonburg that was outside of a 0.25- or 0.5-mile distance to a park or green space.

Findings

After using Figure 1 and Figure 2, it appears that Harrisonburg does not have a low-density residential community. Typically, low-density residential communities are comprised of individual homes that have more open space and are meant for a smaller number of residents (Novinson, 2017). The only low-density area listed on the Harrisonburg zoning guidelines is a low-density mixed residential planned community. Provided this was a planned area, the zoning descriptions placed access to community green spaces as one of their priorities. When comparing Figure 1 and Figure 2, it appears that several residential areas are not within a 0.5-mile radius of an urban park or green space. However, the planned location of this residential community does not fall within a 0.5-mile radius of a park or green space, meaning that this community would have to have their own green space if residents were to be within walking distance.

After analyzing the two figures, while it's not clear how much of an environmental justice issue there is in Harrisonburg, it does appear there is a park accessibility

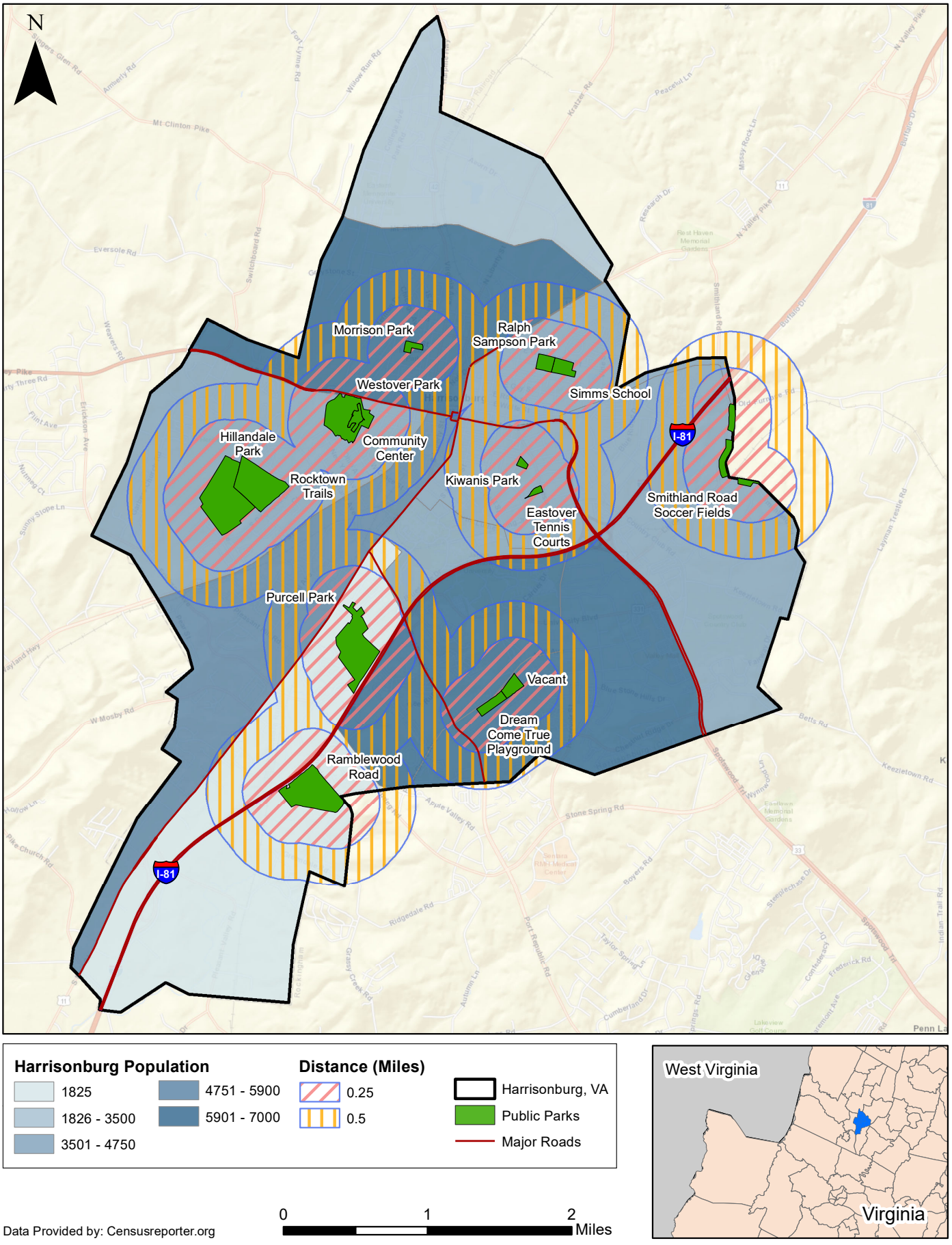

Figure 1. Park Proximity in Harrisonburg, VA.

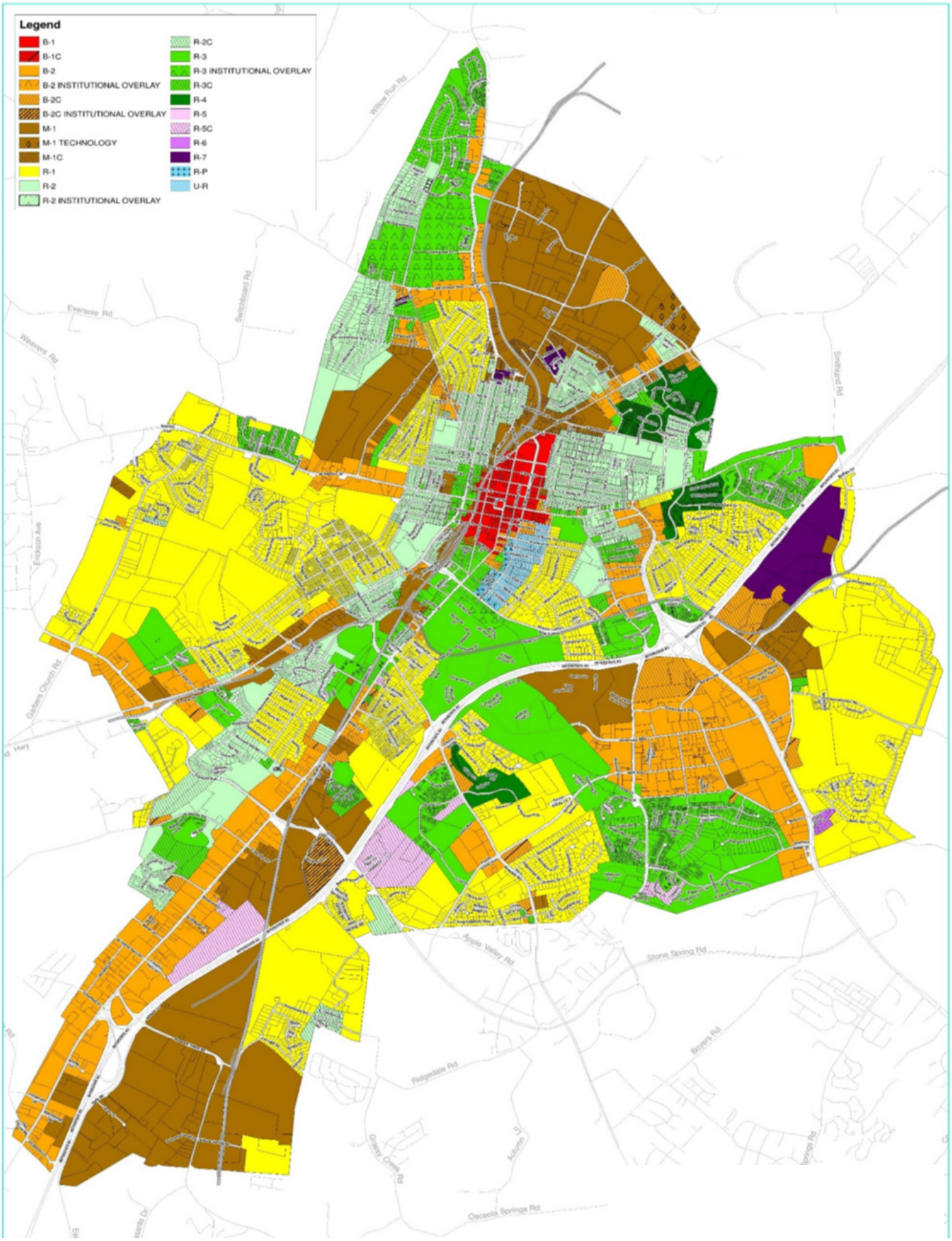

Figure 2. City of Harrisonburg, Virginia, Zoning 2017. Adapted from "Existing Zoning Comprehensive Plan: City of Harrisonburg, VA, A Shared Vision for the Future," 2017. (https://www.harrisonburgva.gov/zoning#Zoning-Districts)

walking distance (less than half a mile) of a park, which does not account for other potential barriers to park access, such as major highways and roads. Among the 63%, high, medium, and low-density communities all faced disproportionate access to green spaces. However, those who reside in high-density neighborhoods may have better means to access parks and green spaces. It is also important to consider that in Figure 2, there is no differentiation between the type of green space as stated by Rigolon and Flohr (formal, informal, intimate; 2014). Therefore, each residential community may be within walking distance to one type of park but not another. This data illustrates that although the environmental justice issue may not be as big of an issue in less populated cities, low and medium density communities still are at a disadvantage, especially if they do not have access to personal or public transportation.

For the future, I believe using the GIS approach may benefit the environmental justice issue of access to urban parks and green spaces. Park planners could use online data sources to determine park proximity (Ussery et al., 2016). This data could then assist park and recreation departments and urban planners identify areas that have a greater need for a new park (Ussery et al., 2016).

Policy Recommendations

As the country continues to urbanize rapidly, many communities find it hard to justify the allocation of land in order to create more parks and green spaces. However, different measures can be taken to provide greater access to these resources that would ensure the same benefits.

The first recommendation would be adding increased transportation and corresponding efficiency. According to Broome, Nalder, Worrall, and Boldy (2010), "The inability to utilise transportation can lead to depression, reduced out of home activities, result in increased social isolation, reduced self-esteem, and contributes to poorer quality of life" (p. 33). Broome et al. interviewed 301 individuals from two cities on what discouraged them from using public transportation. The most common barriers to utilizing public transportation were unsuitable bus times, lack of connecting buses, bus shelters, bus stops and routes, and lack of knowledge on available bus services. Given that most cities have access to some sort of public transportation, the focus needs to be on making transportation more accessible. If transportation were more accessible to communities that did not live within proximity to an urban park or green space, these individuals may be more motivated to use transportation services to access parks and their benefits.

The second recommendation is the implementation of school gardening programs for students. As metropolitan areas are increasing across the United States, school gardening programs are increasingly being added to state school curriculums because of their benefits. School gardens not only create an increased understanding of nature, they also provide children "academic, behavioral, recreational, social, political, and environmental" benefits (Blair, 2009, p. 16).

Gardens are miniature environments that students would have frequent access to (Demas, 1979). By planning their own mini environment, students would be involved with experiential learning in predator-prey relations, pollination, carbon cycles, soil morphology, and several other simple and complex systems (Blair, 2009). This helps to form positive connections between students and nature and the environment, which is shown to result in environmentally sensitive and active attitudes as adults (Chawla, 1998). Also, several studies have revealed a positive difference in test scores (especially science scores) between students who gardened and those who did not (Blair, 2009).

Gardens could become a successful alternative to urban parks and green spaces because they would give students firsthand experience in several of the ecosystem functions that urban parks employ. As mentioned in the literature review, gardens also help children adopt healthier diets and strengthen their relationships with the local community. Gardening helps children gain a broader understanding of plant growth and local sustainable food systems by allowing them to eat their own produce, compost cafeteria food waste, and connect with adult gardeners in their community (Blair, 2009). Planning a garden would typically take place during recess, which may even give children more exposure to nature and the environment than they would if they lived near a park. In addition to health, gardens are part of the natural world which has often proven to be interesting to children. This helps stimulate ideas and information retention since it is a fascinating topic for them (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956).

Conclusion

The three case studies conducted by Wolch et al. (2005), Rigolon and Flohr (2014), and Tinsley et al. (2002) were examined to analyze the relationship between park usage and access between different groups of socioeconomic status in larger U.S cities. The cumulative results showed that there are several regions that are not within walking distance (0.5 miles) to an urban park or green space. Further analysis showed that these regions are often comprised of groups of low-socioeconomic status who are not predominantly caucasian (Tinsley et al., 2002; Rigolon & Flohr, 2014; Wolch et al., 2005) After analyzing these findings, I conducted my own case study of Harrisonburg, Virginia, to research the issue of park proximity in a less

populated community. The initial claim developed was that disproportionate placement of urban parks and green spaces was an environmental justice issue because of the unequal access to park benefits. The three case studies analyzed showed that many large metropolitan areas had parks that were easily accessible for Caucasian groups but challenging for other ethnic groups. The results were not yet so clear for Harrisonburg along racial or socioeconomic lines, although several groups may face disproportionate access to urban parks. By implementing the provided practical solutions of offering more transportation to urban parks and green spaces and integrating environmental education into school curriculums to provide students with daily exposure to nature, access could then be increased.

Author's Note

Victoria Holmes ('19) is an environmental scientist from Virginia Beach. She graduated from JMU with a BS in Geographic Science and recently began working at Kimley-Horn, a planning, engineering, and design consulting firm. She is passionate about environmental and biological conservation.

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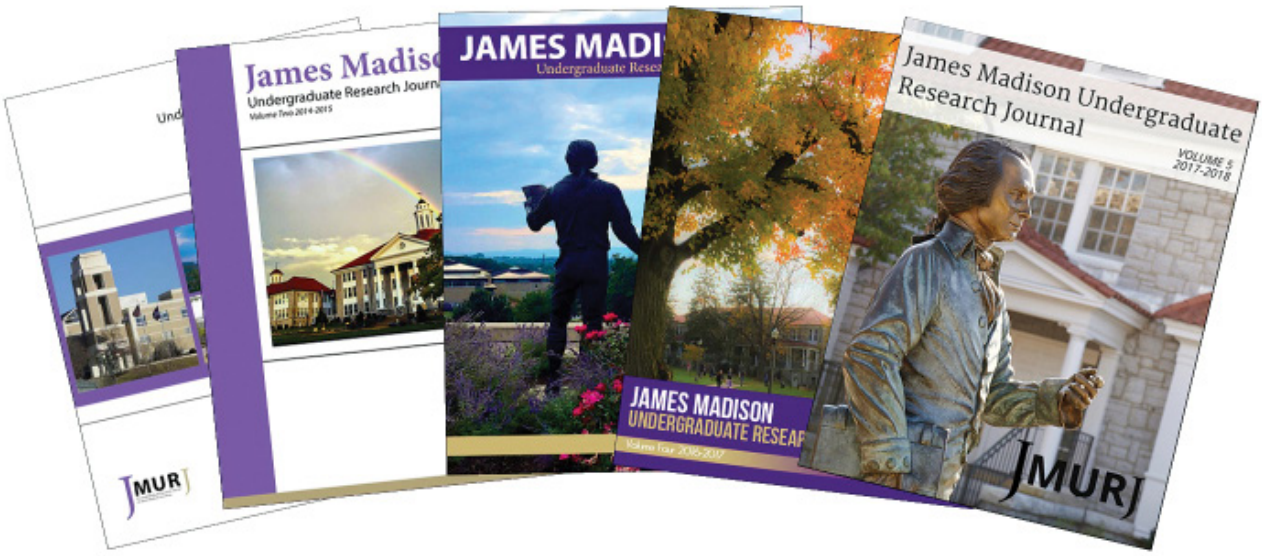

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